APPENDIX B

RESUMES

Donna DeFrancesco

Education: M.S., Candidate Wildlife Biology, University of North Dakota, Grand Forks, ND
B.A., Biology, Northwestern University, Evanston, IL, 1992.

Experience:

2001 to date **Golder Associates** **Washington**

Senior Project Ecologist

Ms. DeFrancesco provides expertise in technical and policy areas of riparian and wetland ecology, function, management and restoration, watershed and habitat planning, instream flow and water quality. She is trained in ACOE Wetland Delineation Procedures for Routine and Comprehensive Wetland Delineations and coordinates with related Golder technical and engineering service areas to provide structural and institutional habitat solutions to client problems. Her project management and technical experience have included: large scale channel and riparian rehabilitation projects; chemical, physical and biological assessments of surface water; riparian and aquatic habitat condition assessment of streams and rivers; water quality characterizations, and instream flow assessments; as well as wetland determination, delineation and restoration.

1997-2001 **University of Montana** **Montana**
Riparian and Wetland Research Program

Project Manager

Ms. DeFrancesco managed and performed physical and biological assessments related to the ecology, condition, management, and restoration of river and wetland systems. Planned and supervised the activities of graduate students, junior staff, seasonal staff and volunteers. Completed technical reports, project budgets, summary reports, grant proposals, designs, drawings, permits, specifications. Coordinated with funding agencies, subcontractors, local, state and federal agencies coordinated meetings, attended technical and public relations events. Presented findings at technical conferences

1995-1997 **ND Game and Fish Department** **North Dakota**

Biologist

Responsible for implementing Northern Coteau Project, a six county private/public lands habitat restoration/enhancement program. Designed and implemented over 80 wetland restoration/creations, native grass restorations, and grazing management systems.

1992-1995 **University of North Dakota** **North Dakota**

Responsible for a two-year field study evaluating the biological communities of newly restored wetlands. Completed a one-year field study of avian and macroinvertebrate use of highway constructed wetlands. Taught upper level Ornithology and Introductory Biology.

1991 **Massachusetts Dept. of Environ. Management** **Massachusetts**

Island Manager

Management of visitor uses for 50-acre Island in Boston Harbor Islands State Park. Gave natural resource/history tours/workshops to over 500 visitors weekly. Planned and supervised the activities of up to 12 park volunteers. .

1990 **Evanston Health Department** **Illinois**

Biological Technician

Responsible for the water quality collection/ E. coli analysis in support of beach use at eight Lake Michigan area beaches.

Donna DeFrancesco

PROJECT EXPERIENCE – INSTREAM FLOW ASSESSMENT

Chewuch River Habitat Conservation Plan, Chewuch Basin Council Washington
Currently completing analysis of instream flow to determine effects of flow improvements in relation to improvements in channel substrate and cover enhancements on the Chewuch River. Information will be incorporated into Chewuch River HCP as alternative management scenarios.

WRIA 45 (Wenatchee) Watershed Planning, Chelan County Washington
Completed an instream flow decision framework. The document is to be used by the Planning to develop an instream flow scope of work and to select appropriate methodologies for instream flow assessment in the Wenatchee watershed.

WRIA 11 (Nisqually) Watershed Planning, Nisqually Tribe Washington
Completed basin historical context and scope of work for implementing an instream flow assessment on the Mashel River using PHABSIM modeling approach. The information is incorporated into the Step A instream flow report completed as part of WRIA 11 Phase 2 Level 2 assessments**.**

WRIA 57 (Little Spokane River) Watershed Planning, Spokane County Washington
Completed an instream flow assessment of the Little Spokane River using a wetted perimeter and PHABSIM modeling approach. Responsible for field data collection of instream flow habitat parameters and discharge and velocity measurements as well as data analysis and report preparation. Also directs the development and updates of the Spokane watershed website.

WRIA 15 (Kitsap Watershed) Watershed Planning Kitsap County Washington
Supervised the completion of field data collection for the Kitsap Step C Instream Flow Assessment an assessment of hydraulic continuity for Barker and Artondale Creeks.

Donna DeFrancesco

PROJECT EXPERIENCE – ENVIRONMENTAL PLANNING

Yakima Habitat Master Plan, City of Yakima **Washington**
Developed a Habitat Master Plan for the Yakima Urban Growth Area including creating criteria for prioritization of stream habitat for acquisition and restoration, prioritized properties for protection, long term monitoring and evaluation plans, as well as recommendations for habitat improvement for existing City of Yakima properties and other associated habitat improvements. Worked with a Technical Work Group of agencies and conservation organizations to develop the plan.

Fruitvale Diversion Irrigation Consolidation, City of Yakima **Washington**
Fish and habitat component of a feasibility study and alternatives analysis. Project focused on reviewing options associated with moving, maintaining, and consolidating three irrigation diversions of the Naches River used for the City of Yakima's irrigation system.

WRIA 29/30 Salmon Habitat Recovery Strategy, Klickitat County **Washington**
Assisted with development of a planning document to be used by the Citizens Review Committee for prioritizing and funding salmon recovery projects within WRIAs 29/30. Document included detailed information on limiting factors for salmonid production within each of the 48 individual subbasins. Subbasin evaluation included: native fish species occurring in basin, status of those species, significant subwatersheds, factors affecting habitat condition, level of certainty, project recommendations, and effectiveness monitoring.

WRIA 14 (Kennedy/Goldsborough) Watershed Planning, Mason Co. **Washington**
Completed multiple sections of Phase II Level 1 assessment for watershed planning in WRIA 14

WRIA 16 (Skokomish/Dosewallips) Watershed Planning, Mason County Washington
Completed multiple sections of Phase II Level 1 assessment for watershed planning in WRIA 14

Hatchery Genetic Management Plan, Methow Salmon Recovery Fdn. **Washington**
Completion of a Hatchery Genetic Management Plan for development of acclimation ponds for steelhead production on the Twisp River.

Hatchery Genetic Management Plan, Colville Tribes **Washington**
Completion of a Hatchery Genetic Management Plan for development of fish hatchery and rearing ponds on the Okanogan River for spring chinook and steelhead.

Rocky Mountain Juniper Management Plans, Turner Enterprises **Montana**
Plan summarizing juniper management procedures and management alternatives for Rocky Mountain juniper (*Juniperus scopularum*) on the riparian areas of a 16,000 acre ranch.

Donna DeFrancesco

PROJECT EXPERIENCE – HABITAT ASSESSMENTS

WRIA 62 (Pend Oreille) Watershed Planning, POCD, Washington

Habitat component for Phase II Level 2 Watershed Planning for WRIA 62. Summarized current and recently completed habitat projects, fish distributions, and data needs for the subbasins of the Pend Oreille Watershed.

Ahtanum Watershed Assessment, Washington Department of Ecology Washington

Developed an overview document describing appropriate methodologies for addressing habitat and instream flow conditions in the Ahtanum Watershed in the context of development of the Pine Hollow Reservoir. Completed a stream channel assessment of riparian, geomorphic and fish habitat of 10 miles of Ahtanum Creek, using BLM Proper Function Condition (PFC) and SSHIAP fish habitat protocols. Utilized the assessment in determining. Provided habitat improvement recommendations necessary to complement management alternatives associated with implementation of Pine Hollow Reservoir.

Pack River Stream Channel Assessment, Avista Corp. Idaho

Worked with Pack River Technical Advisory Committee for completion of a stream channel assessment of 40-miles of the Pack River, a tributary to Lake Pend Oreille in northern Idaho. Stream assessment involved an inventory of geomorphic features, riparian and fisheries habitat. Assessment included Rosgen Level II geomorphic methods, riparian greenline methods, and USFS R1/R4 fish habitat inventory protocols.

Ruby River Watershed Assessment, Turner Enterprises Montana

Project management and implementation of a two year assessment of the physical, chemical and biological characteristics of surface water of a 17 mile reach of the Ruby River and its tributaries to develop recommendations for ranch management and watershed restoration. Assessments included Rosgen Level 2 Stream Channel assessments and riparian condition inventory, hydraulic (HEC-RAS and hydrological modeling), suspended and bedload sediment analysis, temperature analysis, macroinvertebrate community sampling and habitat assessment, depth integrated surface water quality sampling for chemical characteristics and flow.

Musselshell River Assessment, Montana DEQ Montana

Assessment to develop recommendations for land use planning and watershed restoration targets. Assessment sampling plan and with monthly monitoring over a two-year period of chemical, physical and biological, channel stability, riparian vegetation inventory and condition, and channel erosion rates parameters of 37 miles of the Lower Musselshell River surface water.

Red Rock River Assessment, Turner Enterprises Montana

Project management, sampling design and implementation of an assessment of the physical, chemical and biological characteristics of surface water of a 10 mile reach of the Red Rock River. Monthly assessment included, suspended and bedload sediment analysis, temperature analysis, macroinvertebrate community sampling and habitat assessment, depth integrated surface water quality sampling for chemical characteristics and flow.

Fish Survey, Cogentrix Washington

Electrofishing survey of streams of Mercer Ranch to obtain fish species and presence information.

Donna DeFrancesco

Snoqualmie River Wetted Perimeter Assessment
East King County Ground Water Association **Washington**
Survey of multiple reaches on Snoqualmie River to assess fish habitat with relation to flow, water quality and wetted area. Utilized Hankin and Reeves methodology and wetted perimeter analysis. Collected general water quality characteristics including temperature, pH, conductivity.

Stream Inventories, Various clients **Montana**
Conducted stream channel inventories on streams throughout Montana and Idaho Inventories included: PFC, Rosgen geomorphic analysis, R1/R4 fish habitat inventory, greenline and other riparian inventory.

Donna DeFrancesco

PROJECT EXPERIENCE – WATER QUALITY ASSESSMENTS

Lake Coeur D'Alene Temperature Assessment, Avista Corp. Idaho

Currently completing an assessment of temperature of nearshore habitat, rivers, and minor tributaries of Lake Coeur d'Alene. Information will be used to address implications of management scenarios for Post Falls Dam as a component of the FERC Re-licensing of dam.

WRIA 15 (Kitsap) Watershed Planning, Kitsap County Washington

Completed the water quality component for Phase II Level 1 Watershed Planning for WRIA 15. Assessment included a compilation of existing data on beneficial uses, pollutants, 303(d) listings, TMDL developments, sources of point/nonpoint pollution and data gaps.

Ruby River TMDL Assessment, Watershed Consulting Montana

Project management for completion of Phase I components of a water quality data review for 303(d) listed streams within the Ruby River watershed of southwestern Montana. Components included historical water quality and watershed condition summary, organization of water quality database, and visual representation through GIS of nutrient, metal, sediment, and temperature data for impaired waterbodies. Phase II components will involve completion of a TMDL for sediment and temperature for the basin.

Assessment of State Grazing Guidelines, MT Department of Environmental Quality/Bureau of Land Management Montana

Project management for an evaluation of the effectiveness of the Montana State Grazing Guidelines for protecting surface water quality and aquatic habitat in the Medicine Lodge and Box Elder Creek watersheds of Montana. Four year project involved establishment riparian habitat inventory, Rosgen Level II geomorphic assessments and riparian condition inventories., surface water quality sampling, grazing level indicator monitoring (browse, stubble height, streambank alteration, key area grazing), macroinvertebrate habitat and community sampling, channel cross-section geometry, aquatic habitat features (fine sediment, canopy cover, percent undercut banks, etc.).

Donna DeFrancesco

PROJECT EXPERIENCE – RIVER AND STREAM RESTORATION

Centralia Mine Stream Restoration Plan, TransAlta — Washington

Project management, riparian and fish habitat restoration designs to rehabilitate 28000 feet of Packwood, North and South Hanaford Creeks upon closure of the Centralia Mine site. Plans include preliminary design specifications, plan, representative cross-sections and profile views along with fish distribution, habitat and riparian restoration recommendations and planting plans to be included in the OSM permit for Centralia Mine.

Ruby River Restoration Plans, Turner Enterprises — Montana

Project management, channel, and riparian restoration designs to rehabilitate 17 miles of the Ruby River, Montana. Managed a multidisciplinary staff of professionals and technicians. Design development involved data collection, survey, and analysis of hydrological, geomorphological, hydraulics, and sediment. Hydrological evaluations included: flood-frequency analysis, effective discharge analysis, determination of design discharge and flow-duration curves. Geomorphological analysis included evaluation of channel and bed stability, collection and analysis of particle size distribution, determination of valley width, channel reach slopes, historic channel migration, channel geometry, channel planform and pattern, sinuosity, riffle/pool run ratios. Hydraulics analysis included use of HEC-RAS analysis of hydraulic variables for various flow events and treatment components. Treatment design components included: use of juniper revetments, root wads, grade control, brush bars, riparian revegetation using mature transplants and willow stakes, and bank overhanging revegetation.

Clark Fork River Streambank Stabilization, ARCO — Montana

Project management, development, data collection, and analysis of 23 different streambank restoration designs of eroding banks on the Upper Clark Fork River (longest Superfund site in the US). Principle author of report on the Upper Clark Fork River Streambank Stabilization Pilot Project. Hydrological evaluations included: flood-frequency analysis, effective discharge analysis, determination of design discharge and flow-duration curves. Secured permits and prepared construction drawings. Treatments included: mature willow transplants, container vegetation, willow stakes and poles, rock barbs, log barbs, coir fascines, willow/redosier dogwood fascines, rock toes double-rolled coir fabric, etc. Monitoring included over 140 permanently monumented channel cross-sections. Analysis included rates of channel migration, hydraulic variables, channel width to depth, etc.

Ruby River Bank Stabilization, Turner Enterprises — Montana

Project management of stabilization of 36,000 feet of riprap with vegetation. Responsible for design, implementation, and crew supervision in collection, preparation, and planting and of over 80,000 willow stakes. Responsible for site selection for placement, collection guidelines, and subcontractor supervision of transplanting and watering mature willow to stabilize eroding riprap.

Donna DeFrancesco

PROJECT EXPERIENCE – WETLANDS

Delineation of Created Wetlands, Fort Knox Gold Mining Inc **Alaska**
Data review, field delineation, fish habitat review and reporting over 200 acres of wetlands. Project assessed mitigation compliance of FGMI with respect to created ponds, water supply reservoir, and stream habitat enhancements developed on the Fort Knox Gold Mine in Fairbanks Alaska.

Maryhill State Park Wetland Delineation, WA Parks and Recreation **Washington**
Site review, delineation and reporting of wetlands on the Maryhill State Park for impacts pertaining to planned development of a Columbia River boat launch.

Fircrest Wetland Determination WA Dept. Health Human Services **Washington**
Data and field review of 90 acre Fircrest School campus for determination of wetland presence and extent for an environmental site audit. Field delineation of wetlands.

Wetland Restorations/Creations, Various clients **North Dakota**
Completed over 80 wetland restoration, creation and enhancement projects on National Wildlife Refuges, National Waterfowl Production Areas, private and tribal lands throughout North Dakota. Responsible for site selection, hydrological/biological suitability investigations, engineering design, cultural resource approvals, permitting, bid-letting, construction layout and supervision. Coordinated with landowners and completed contracts, tracked project budget, wrote grant proposals, recruited new partner organizations, and coordinated activities of all partners (including ND Game and Fish, USFWS, Ducks Unlimited, Nature Conservancy, etc). Represented projects at state/local meetings

Wetland Creation, Turner Enterprises **Montana**
Survey, site review, water rights review, project design, flow calculations, construction specifications, permitting, construction designs for 2.7 acre wetland creation for waterfowl habitat.

Donna DeFrancesco

ADDITIONAL TRAINING

PHABSIM (Physical Habitat Simulation Model) Training -Utah State Univ. 2002
Instream Flow Incremental Methodology (IFIM) Training USGS 2002
Stream Geomorphology and Rehabilitation-University of Washington 2001
Natural Channel Design- Interfluve 2000
Water Quality Monitoring Training-NRCS 1999
Riparian Inventory Techniques –University of Montana 1998
ACOE Wetland Delineation Procedures – 1997
Wetland Construction Design – NRCS 1995

Donna DeFrancesco

PUBLICATIONS

DeFrancesco, D. and P. Hansen. 2000. The Effectiveness of Streambank Stabilization Techniques for Reducing Bank Erosion on the Upper Clark Fork River, Western Montana. In *Proceedings of the 2000 Billings Land Reclamation Symposium*, Billings, MT.

Chadwick, A., Bozorth, T., DeFrancesco, D., and P. Hansen. 1999. Evaluating Grazing Best Management Practices for Protecting Water Quality in Montana. In *Proceedings of Wildland Hydrology Specialty Conference.* American Water Resources Association. Bozeman, MT.

Hettick, P., Wesienberger, T., DeFrancesco, D., Clayton, S., and P. Hansen. 1999. Field and Software Analysis Techniques for Determining Changes in Streambank Surface Volumes on the Upper Clark Fork River. In *Proceedings of Wildland Hydrology Specialty Conference.* American Water Resources Association. Bozeman, MT.

PRESENTATIONS

"The Effectiveness of Streambank Stabilization Techniques for Reducing Bank Erosion on the Upper Clark Fork River, Montana". 2000. Billings Land Reclamation Symposium. Billings, MT.

"The Effectiveness of Streambank Stabilization Techniques for Reducing Bank Erosion on the Upper Clark Fork River, Montana. 2000. Clark Fork River Watershed Symposium. Missoula, MT.

"The Effectiveness of Bank Stabilization Techniques for Reducing Erosion on the Upper Clark Fork River". 1999. 7th National Nonpoint Source Monitoring Conference. Morro Bay, CA.

"Evaluating Grazing Level Indicators as Grazing Best Management Practices in Montana". 1999. 7th National Nonpoint Source Monitoring Conference. Morro Bay, CA.

"Evaluating Grazing Level Indicators as Grazing Best Management Practices in Montana". 1998. 6th National Nonpoint Source Monitoring Conference. Cedar Rapids, IA.

"Breeding Bird Communities of Prairie Pothole Restored Wetlands" 1995. Midwest Fish and Wildlife Conference. Detroit, MI.

Lee K. Holder, P.E.

Education: B.S. *cum laude*, Environmental Engineering, Rice University, 1977.

Registrations: Registered Professional Engineer (Texas and Washington).

Experience:

1993 to date **Golder Associates** **Redmond, Washington**
Associate; Senior Environmental Engineer
Managing and performing water and wastewater treatment system design, site cleanup feasibility studies, and remediation design involving soil, groundwater and sediments for industrial and government clients. Assisting industrial clients in compliance and permitting with air, hazardous waste, and stormwater regulations.

1991 - 1993 **PTI Environmental Services** **Bellevue, Washington**
Senior Engineer
Managed all engineering work performed by the company. Projects focused on feasibility studies under CERCLA and state law (e.g., MTCA), evaluating remediation technologies, and conducting site remediation. Reviewed feasibility studies and RCRA permit applications for the U.S. EPA. Performed a BACT evaluation of refinery air emissions for an oil refinery in Tacoma.

1984 - 1991 **ERM**
Senior Engineer **Bellevue, Washington**
Project Manager **Houston, Texas**
Managed and performed numerous remediation projects for both hazardous and non-hazardous waste sites. The scope of these projects included engineering design, preparation of bid documents, construction management, and closure certification. Managed and performed feasibility studies for several CERCLA sites. Performed numerous projects related to RCRA compliance, including complete Part B permit applications. Performed several projects on NPDES compliance and wastewater treatment design.

1983 - 1984 **Resource Engineering** **Houston, Texas**
Project Engineer
Consulted on solid and hazardous waste management, including: site investigations at CERCLA sites; investigation and remediation of a PCB-contaminated site; evaluation of landfarm performance; preparation of RCRA closure/post-closure plans; preparation of SPCC plans.

1978 - 1981 **Charter Oil Company** **Houston, Texas**
Environmental/Process Engineer
Responsible for compliance with federal and state regulations for hazardous and solid waste, wastewater, stormwater, and spill control. Also provided engineering oversight and instituted process improvements for the refinery wastewater treatment system and sulfur recovery complex.

1977 - 1978 **Rice University** **Houston, Texas**
Research Engineer
Conducted research on hazardous substances for the EPA.

Lee K. Holder, P.E.

SELECTED PROJECT EXPERIENCE

White King / Lucky Lass Mines Superfund Site — Lakeview, Oregon

Managing the design and implementation of remediation for two former uranium mines in south-central Oregon under CERCLA. Golder was retained after completion of the RI/FS to provide (1) design and construction management for the remedy, and (2) biological studies related to water and sediment quality. Golder has completed the Remedial Design (RD) Workplan and a workplan for biological studies in the White King Pond – a mining pit now filled with water – and the adjacent creek. Constituents of concern include radioisotopes (primarily uranium and radium) and arsenic. The ROD identified unresolved concerns over potential impacts to stream sediments and bioaccumulation of metals. Golder is performing field tests of bioaccumulation using mussels, and evaluating appropriate aquatic biological habitat goals. Based on the results of these biological studies, Golder will also assist in determining what, if any, remediation is necessary for the pond and creek. Golder is currently preparing the remedial design of the remedy, which includes consolidating mining overburden stockpiles and capping the combined stockpile.

Pasco Bulk Fuel Terminals Site — Pasco, Washington

Managing the design and implementation of remediation for this large brownfields site under MTCA (state Superfund). The clients are Crowley Marine Services, Inc. and the Port of Pasco. Site contaminants are non-aqueous phase liquid (NAPL), petroleum compounds, and chlorinated volatile organic compounds (VOCs). Retained after completion of the RI/FS and remedy selection to comment on the draft Cleanup Action Plan (CAP). Reviewed the proposed remedy and discovered that the proposed remedial technologies would not meet all of the proposed cleanup levels. Successfully renegotiated the cleanup levels. Also negotiated a revised, flexible remedy that allows using an innovative "adaptive management" approach to allow step-wise remedial design/remedial action (RD/RA). Thus, results of the initial phases of remedial action were used to optimize subsequent RD/RA. Next managed preparation of the MTCA remedial action plans for the site. Treatment primarily consists of in-situ air sparging (IAS) and soil vapor extraction (SVE). Limited pump-and-treat is also used. Golder designed and constructing the full-scale remediation systems, which are now in operation. Golder designed, programmed, and installed the control system and telemetry to allow remote monitoring and control. Golder operates and maintains the treatment systems for the Client.

McKesson Corporation — Omaha, Arkansas

Managed the Feasibility and Treatability Studies for the Arkwood CERCLA site in Arkansas. The Treatability Study covered stabilization (fixation), soil washing, slurry biotreatment, land treatment, and chemical treatment. Alternatives included excavation and off-site disposal, incineration (on- and off-site), on-site landfill, on-site treatment by stabilization (fixation), soil washing, slurry biotreatment, land treatment, or chemical treatment. The EPA selected incineration (due to dioxins), but was convinced to add soil washing to decrease the cost of the remedy by 80%. Negotiated natural attenuation for affected groundwater.

Sheridan Superfund Site — Sheridan, Texas

Performed concept design and evaluation of an incinerator for this CERCLA site in Texas. Assisted in preparation of the Feasibility Study, including all cost estimating.

French, Ltd. Superfund Site — Crosby, Texas

Reviewed prior site investigation documents preparatory to further investigation. Performed site investigation fieldwork.

Lee K. Holder, P.E.

Allied Signal Corporation **Onondaga, New York**

Performed the initial Feasibility Study work on lake sediments for an industrial client at the Onondaga Lake CERCLA site. The constituent of greatest concern was mercury. The work included evaluation of dredging, capping, ex-situ treatment, in-situ treatment.

Zoecon Corporation (subsidiary of Sandoz) and
Occidental Chemical Corporation **Dallas, Texas**

Managed the design and construction of site remediation for a pesticide plant in Dallas, Texas. Site remediation included soil excavation and disposal, slurry wall construction, capping, and design and construction of a 50-gpm system to recover, treat, and reinject groundwater containing pesticides and hydrocarbons. Reinjection wells were installed inside a building minimal disruption to operations. Soil excavation, slurry wall construction, and treatment system construction were all scheduled to avoid disruption of the facility's raw material deliveries and product shipments.

Occidental Chemical **Dallas, Texas**

Performed closure of a hazardous waste surface impoundment at an operating manufacturing plant. Waste in the impoundment, which contained arsenic and elemental phosphorus, was excavated, treated by stabilization, ash, and disposed off-site. An impermeable cap was placed over the remaining contaminated soil.

Continental Can **Longview, Texas**

Conducted RCRA (hazardous waste) and UST (underground storage tank) closure activities for an operating can manufacturing facility. The solvent-contaminated soils were remediated on-site by land treatment. Tanks contents (hazardous and non-hazardous wastes) were disposed off-site. Prepared bid specifications, selected the remediation contractor, managed site activities, and certified closure.

Mepco/Centralab (Subsidiary of North American Philips) **Mineral Wells, Texas**

Conducted RCRA and UST closure activities for an operating electronics manufacturing plant. Solvent-contaminated soils were remediated on-site by land treatment. Prepared bid specifications, selected the remediation contractor, managed site activities, and certified closure.

Arco **Butte, Montana**

Prepared the Development of Alternatives Report for the Smelter Hill operable unit of the Anaconda CERCLA site. Alternatives included extensive evaluation of institutional controls and several approaches to cost-effective reclamation, as well as capping. Excavation and disposal alternatives were rejected as infeasible. The primary constituents of concern were arsenic and lead.

Arco **Houston, Texas**

- Investigated closed disposal sites containing tars and other heavy oils for this major oil refinery.
- Evaluated operation of the landfarm at this major oil refinery.

Blackbird Mine Superfund Site **Salmon, Idaho**

Golder has assisted the potentially responsible parties (PRPs) on cleanup of this site for many years. Constituents of concern (COCs) include arsenic, copper, and cobalt. Mr. Holder served as Lead Engineer for the Feasibility Study (FS) for this site, managing preparation of conceptual design of remediation alternatives, cost estimating, modeling effectiveness of the alternatives, addressing "substantive compliance" NPDES (permitting) issues, and assisting in remedy negotiations with the agencies (EPA and IDEQ). Performed detailed design of the remedy.

Tulalip Landfill Superfund Site **Marysville, Washington**

Assisted in preparation of the CERCLA Feasibility Study for the Tulalip Landfill near Marysville and Everett, Washington.

U.S. EPA **Seattle, Washington**

- Served as senior technical reviewer for site remediation documents. In this role, performed technical reviews of 5 CERCLA feasibility studies on behalf of the U.S. EPA for the Umatilla Army base in Oregon.
- Provided engineering review of site remediation documents for the EPA at numerous other sites.
- Prepared a technical memorandum discussing the strengths, weaknesses, and costs of soil washing for treating lead-contaminated soils.

U.S. Department of Energy **Hanford Reservation, Washington**

- Performed the CERCLA Phase I/II and Phase III feasibility studies for the 300-FF-5 groundwater operable unit. Primary constituents of concern were uranium isotopes. Prepared conceptual design and cost estimates for alternatives including institutional controls, selective and extensive containment (with a slurry wall), and selective and extensive groundwater extraction and treatment. Treatment focused on ion exchange; other metal removal methods (e.g., precipitation and reverse osmosis) were considered but not cost-effective for this site. Alternatives were developed with and without slurry walls to evaluate the cost-effectiveness of containment. Selective and extensive cleanup levels were developed based on risk evaluation, maximum contaminant limits (MCLs), and cost-effectiveness. Institutional controls was recommended based on minimal risk.
- Performed the Phase III (final) Feasibility Study for the 300-FF-1 soils operable unit. Primary constituents of concern were uranium isotopes, cobalt-60, and copper. Prepared conceptual designs and cost estimates for alternatives including soil cover, impermeable capping in-place, excavation and disposal, and soil washing. Evaluated soil washing based on a field (pilot-scale) Treatability Study. Stabilization (fixation) was included in some alternatives.
- Assisted in preparation of the Feasibility Study for the 200-BP-1 operable unit. The recommended alternative was capping and groundwater monitoring.

Whirlpool Corporation **Milan, Italy**

Designed and prepared construction bid packages for a 400-gpm groundwater extraction and treatment system. Contaminants were chlorinated volatile organic compounds (VOCs). The extraction system consisted of 26 wells over an area of greater than one square mile within an operating manufacturing facility. The treatment system consisted of precipitation to remove hardness and iron, air stripping for the VOCs, and offgas treatment using catalytic oxidation. The system included a computer control system with telemetry.

Mobil Chemical Company **Texas**

- Reviewed spill prevention and control measures for a petrochemical manufacturing facility. Recommended low-cost capital and operating changes to improve effectiveness.
- Prepared a spill prevention plan to address requirements of both spill prevention, contingency and countermeasures (SPCC) regulations and also hazardous waste regulations for the facility. Two versions were prepared: a “full” version for regulatory review and a condensed, focused version for use in operator training.

Exxon **Baytown, Texas**

Managed operations of a landfarm within Exxon's Baytown refinery.

Lee K. Holder, P.E.

Confidential Client **Exxon Bayway Refinery, New Jersey**

Prepared site remediation cost estimates used in negotiating the potential sale of Exxon's Bayway refinery, on behalf of the prospective purchaser.

Texaco **Napierville, Illinois**

Investigated waste disposal sites within an inactive Texaco refinery.

Monsanto Corporation **Soda Springs, Idaho**

Assisted in preparation of the Feasibility Study (waste, soil, and groundwater) for a phosphate plant. Groundwater alternatives included containment, pump-and-treat, and combinations of containment and treatment. Primary constituents of concern were metals. Groundwater treatment technologies evaluated included reverse osmosis, ion exchange, hydroxide precipitation, and sulfide precipitation.

Monsanto Chemical Company **Los Angeles, California**

Evaluated remediation alternatives for two chemical plants in southern California with arsenic and benzene in soil and groundwater. Performed field test of soil vapor extraction (SVE) for soil cleanup and air sparging for groundwater cleanup.

American Petroleum Institute (API) **Washington, D.C.**

- Estimated the effects and nation-wide costs to the oil industry of proposed land treatment permit regulations. The API used the report in preparing comments on the proposed regulations.
- Estimated the effects and nation-wide costs to the oil industry of proposed new hazardous waste listings. The API used the report in preparing comments on the proposed regulations.

Chevron Salt Lake City Refinery **Salt Lake City, Utah**

Under a Consent Order with the State of Utah, Chevron had investigated waste sites at its refinery in Salt Lake City. Sixteen wastes sites were identified. Prepared a comprehensive closure plan covering all sixteen sites. Prepared a separate RCRA closure plan for the sites that were hazardous waste facilities. Assisted in negotiations with EPA Region 8 as well as state regulators.

Sound Refining, Inc. **Tacoma, Washington**

- Assisted in solving an odor emission problem. The project involved negotiating an agreed order with the Puget Sound Air Pollution Control Agency (PSAPCA), identifying potential odor sources, evaluating control measures, and recommending a cost-effective solution.
- Prepared an analysis of Best Available Control Technology (BACT) for sulfur emissions in response to an order from the Puget Sound Air Pollution Control Agency (PSAPCA). In addition to the BACT analysis, performed an economic comparison of BACT options. The refinery selected replacing aging process heaters as the most economic option. Negotiated an implementation schedule with PSAPCA, and then assisted the refinery in selecting, permitting and installing the replacement process heaters. Prepared the Notice of Construction (NOC) and associated air modeling.
- Assisted in negotiating with the Washington Department of Ecology on a proposed fine for alleged NPDES permit violations. The fine was reduced approximately 30% as a result of the negotiations.
- Performed predesign and design work for improvements to the wastewater treatment system. Assisted the refinery with installation and startup of system improvements.
- Prepared a stormwater management plan for the facility.

Diamond Shamrock **Three Rivers, Texas**

Prepared a complete RCRA Part B permit application for an oil refinery. Permitted facilities included a land treatment facility (landfarm) and tank storage.

Lee K. Holder, P.E.

Gulf Oil Products **Pittsburgh, Kansas**

Wrote the Post-Closure Care Plan for the evaporation pond at the Jayhawk Plant.

White Pass Alaska **Skagway, Alaska**

- Assisting the company with evaluation and purchase of a soil thermal treatment unit.
- Performing permitting work for operation of the unit to treat petroleum-contaminated soils.

Unocal **Beaumont, Texas**

- Evaluated options for waste treatment and waste minimization for the Unocal refinery in Beaumont, Texas.
- Performed an engineering evaluation of closure options for a sludge impoundment within the refinery.

Unocal **California, Illinois, and Texas**

Performed a RCRA study involving all five of Unocal's refineries to determine the optimal strategy for responding to land disposal restrictions on refinery hazardous wastes. Both regulatory and engineering solutions were evaluated. The study focused on recycling and waste reduction strategies to minimize the cost of waste treatment and disposal. The study involved negotiations with the U.S. EPA and regulators in California, Illinois and Texas.

Unocal **California and Illinois**

Performed a waste minimization study for three Unocal refineries. For each of these plants, the study identified types of wastes and characterized individual waste streams. Opportunities were identified for reducing the quantity of waste generated, lowering the toxicity of wastes, and recycling. Waste minimization plans were evaluated and revisions recommended as needed.

Timothy L. Martin, P.E.

Education: M.Sc., Geological Engineering, Washington State University, 1986
B.Sc., Geological Engineering, Washington State University, 1985
B.S., Forest Resource Management, University of Idaho, 1974

Affiliations: Registered Professional Engineer, Washington, Idaho, Ohio, Maryland, Virginia, and Delaware
Member, American Society of Civil Engineers

Experience:

2005 to Date **Golder Associates** **Coeur d'Alene, Idaho**
Principal, Senior Consultant
Office Manager/Project Manager/Certifying Engineer for geotechnical projects, the power industry, mining site development, construction management, geotechnical engineering for litigation, transportation, building foundations, new landfill construction, expansions, and closure projects.

1993 - 2005 **Golder Associates** **Richmond, Virginia**
Associate, Senior Consultant
Office Manager of the Golder Richmond, Virginia office. Project Manager/Certifying Engineer for geotechnical projects, the power industry, mining site development, construction management, geotechnical engineering for litigation, new landfill construction, expansions, and closure projects in Virginia, Maryland and North Carolina.

1990 to 1993 **Golder Construction Services, Inc.** **Mt. Laurel, New Jersey**
Senior Engineer
Resident Project Manager/Certifying Engineer for large landfill expansions in Maryland and Pennsylvania; Project Manager/Certifying Engineer for numerous landfill expansion and new construction projects in Maryland, Ohio, and Pennsylvania.

1988 - 1990 **Golder Associates** **Redmond, Washington**
Project Geotechnical Engineer
Design Engineer of a RCRA compliant radioactive-mixed-waste landfill for the Department of Energy, Hanford Nuclear Reservation, Washington; final cover designs for a hazardous waste facility, Kettleman City, California; geotechnical excavation in permafrost for Alyeska along the Alaska Pipeline and the tug dock expansion at the loading terminal, Valdez, Alaska; and Project Manager for local geotechnical projects involving pile supported structures, pavement design, and foundation investigations. Field supervisor for CQA during the construction of Landfill B-19 at the Kettleman Hills Facility, Kettleman City, California. Geotechnical Engineer at the TITISA plant expansion, Tijuana, Mexico; responsibilities included in the design and construction supervision of two access roads, incinerator pads, future expansion platforms, drainage structures, and report preparation. Waste Management's Adam Center South Property expansion, Ft. Wayne, Indiana; duties included field exploration, engineering analysis, and report preparation. Summitville Mine, Summitville, Colorado; responsibilities included slope stability analysis, water balance analysis for a heap leach processing plant, and report preparation. King County, Washington; involved with exploration, analysis, geotechnical design, and project management in a retaining wall project. Project Engineer for numerous studies throughout the Seattle, Washington area, including soil mechanics, pile analysis, and foundation engineering.

Timothy L. Martin, P.E.

1986 - 1987 **Golder Associates** **Redmond, Washington**

Staff Geotechnical Engineer

Live Oak Landfill, Atlanta, Georgia; duties included soil/rock logging and monitor well installation for east and west expansion areas. Field Engineer during the geotechnical investigation of 17 miles of the relocated section of State Route 504 in mountainous terrain near Mount St. Helens for the Washington State Department of Transportation. Basalt Waste Isolation Project, Richland, Washington; responsible for evaluating technical consistency of the Systems Engineering Management Plan. Kettleman Hills Facility, California; duties included CQA observation and on-site laboratory manager for soil/synthetic testing.

GEOTECHNICAL PROJECT EXPERIENCE

Brownfields

Riverstone Development **Coeur d'Alene, Idaho**

Design engineer for the base grades, liner system, gas venting system, pipeline, river intake structure, and pump station for a 6-acre man-made lake in the new Riverstone development. The lake, which is approximately 25-feet in depth, is being constructed in an old sand and gravel pit adjacent to the Spokane River in Coeur d'Alene, Idaho. The lake required a liner to maintain water as the subgrade is sand. In addition, some of the previous subgrade is highly organic and therefore the design includes a gas venting system under the liner system. The design includes a safety shelf, an access road into the lake, as well as a pipeline from the river to the bottom of the lake over the liner system. The lake has several aesthetic features, including a waterfall, a railroad car bridge, an artificial stream recycled into the lake, a floating 60-foot fountain, an amphitheater, and fountains from large rock columns. Immediately adjacent to the lake is a bike trail, two restaurants, a business park, and a 4-acre park.

Repository

Big Creek Repository **Kellogg, Idaho**

Project Manager for the subsurface site characterization, soil stability analysis and recommendations for design and construction of a proposed vertical expansion of the Big Creek Repository located in Shoshone County, Idaho for the Idaho Department of Environmental Quality. The purpose of the study was to explore the current repository fill and foundation soils (consisting of historic mine tailings) to determine their geotechnical strength parameters relative to the stability of the proposed expansion.

Hydrogeological Investigations

Clover Power Station Stage III Landfill Expansion **Clover, Virginia**

Project Manager/Design Engineer for the Part B Permit design for the approximate 90-acre Stage III coal ash monofill landfill expansion. Responsibilities included hydrogeological investigation, obtaining soil and water samples for laboratory testing, analysis of test data, and report preparation. Design responsibilities included preparation of: conceptual, preliminary, and final design drawings, construction specifications, engineering analyses, a final design report, an operations plan, a closure plan, a construction quality assurance plan, an engineer's cost estimate of construction, an estimated construction schedule, and preparation of bid documents.

Adams Center Landfill **Fort Wayne, Indiana**

Adam Center South Property expansion, Ft. Wayne, Indiana; hydrogeological investigation for a landfill expansion. Duties included field boring exploration, monitoring well installation, engineering analysis, and final report preparation.

Timothy L. Martin, P.E.

Live Oak Landfill **Atlanta, Georgia**

Performed soil/rock borehole logging and monitoring well installation for a hydrogeological investigation of the east and west landfill expansion areas.

NRG Indian River Power Station **Millsboro, Delaware**

Project Manager and PE for the permitting, and design of a 120-acre Phase II coal ash industrial waste landfill expansion. Work included a hydrogeological investigation, an environmental assessment, closure design of the existing 43-acre Phase I coal ash landfill as well as the design of the Phase II landfill. The project included developing design drawings, construction specifications, groundwater monitoring plan, operations plan, design report, and a leachate treatment system.

Chesterfield Power Station **Chester, Virginia**

Senior Reviewer for a landfill site assessment of the 228-acre property for the Chesterfield Power Station. The purpose of the landfill assessment was to determine if the proposed property may contain a fatal flaw that would prohibit Dominion Generation from permitting the property as an industrial landfill to receive Coal Combustion By-Products (CCB). Golder's landfill assessment included conducting a Phase 1A historical and cultural resource study, a wetlands determination, a survey for endangered species, a review of the property and the adjacent property for water wells and seeps, and a characterization of the soil and the groundwater flow direction study of the property. As part of the assessment, Golder performed a hydrogeological investigation that included three new groundwater monitoring wells and performed sampling of the groundwater to determine the potential from off-site migration of pollutants from an adjacent property.

Mt. Storm Power Station **Mt. Storm, West Virginia**

Senior Reviewer and Project Director in the development of a report regarding the observations of the existing leaking leachate ponds at the Mount Storm Power Station. The report outlined five (5) options to either repair or replace the leaking leachate ponds. The report was based on three criteria for the solution to the leaking ponds that included: to maintain one of the ponds in operation while the other pond is repaired or replaced, secondly, to maintain the existing pond storage capacity, and third, to maintain a leak detection zone for the ponds. Golder is currently preparing construction bid documents for the Mt. Storm Power Station project and will perform Construction Quality Assurance (CQA) services during the relining of the coal ash leachate basins.

Possum Point Power Station **Dumfries, Virginia**

Senior Reviewer and Project Director during a Phase I Environmental Site Assessment for portion of property at Possum Point Power Station. Phase I was requested by lending institution as part of a property transaction. As a result of the findings of the Phase I, Golder made recommendations to Virginia Power to complete a limited Phase II assessment that revealed the presence of subsurface contamination. Golder prepared a comprehensive subsurface assessment and a Site Characterization Report as required by the Virginia Department of Environmental Quality and a risk assessment. The risk assessment and SCR resulted in no further action required at the site.

Douglas J. Morell

Education: B.Sc., Geology, Miami University, 1973.
M.Sc., Geology (Geochemistry), Miami University, 1978.
Ph.D., Geology (Hydrogeology), University of Idaho, 1985.

Registrations: Licensed Professional Geologist and Hydrogeologist (Washington)

Experience:

1983 to date **Golder Associates** **Redmond, Washington**

Associate to Principal

Dr. Morell is a Principal with Golder Associates and has over 30 years of experience in contaminant hydrogeology and geochemistry. As a faculty member at the University of Idaho, College of Mines, Dr. Morell taught undergraduate and graduate courses in hydrogeology and hydrochemistry from 1981 - 1982. He was a member of the Hanford Groundwater Modeling Committee and was tasked with identifying appropriate codes and strategies for predicting groundwater migration in the subsurface environment for Hanford CERCLA RI/FS documents.

Responsible for investigation and remediation studies relating to waste management for the chemical, nuclear, and mining industry. He is a well-recognized expert in hydrogeologic evaluations and the fate and transport of hazardous chemicals in the environment. Project manager and technical leader for over 30 CERCLA and State MTCA investigations or remediations. Hydrologeologic characterizations include: the Landsburg site, Norseland site, CERCLA Tulalip Landfill and RECOMP Ash Landfill sites in western Washington and the CERCLA Colbert, Northside and Greenacres Landfills in Spokane, Washington. Dr Morell was the lead hydrogeologist for the siting and hydrogeologic sections of the SEPA EIS for proposed regional landfills for Spokane, Okanogan and Whatcom Counties. He is the Project manager for groundwater characterizations and monitoring at the U.S. Army Munitions Umatilla Landfill in Oregon. Managed the remedial investigation on an CERCLA and MCTA abandoned petroleum refinery and bulk fuel facility (North Market Street Site in Hillyard) and a PCB Superfund site in Spokane, Washington. Lead hydrochemist for investigation and interpretation of contaminant fate and migration mechanisms of inorganics in groundwater at a CERCLA elemental phosphate chemical plant in Idaho.

Dr. Morell is an expert in organic contaminant fate and transport. He is currently the Technical Reviewer for contaminant (PCE, TCE) migration Phelan Landfill, California where groundwater is at 1,000-foot depths. Dr Morell co-authored a paper of a research project of the Phelan landfill for Norcal that involved vadose zone modeling and model calibration of the effect of capping on groundwater impacts from subsurface landfill gases. He has performed natural attenuation modeling analysis for PCE and vinyl chloride at the Morongo Valley Landfill, California. Dr. Morell is the Hydrogeological and Geochemical Technical Leader for the CERCLA Kunia RI/FS site, Hawaii where groundwater is over 800 feet deep in fractured basalts, which the contaminates of concern include chlorinated volatile pesticides (EDB, DBCP and TCP).

Currently, Dr. Morell is the hydrogeological leader on long-term pump testing at the CERCLA Blackbird Mine site in Idaho for the purpose of capturing metal impacted groundwater and seeps from discharging to receiving streams in both fractured bedrock and colluvium aquifers. He is currently also the Technical Leader on the Norpetro Chemical site, where Golder is conducting a RFI/CMS for this RCRA site. Past practices included disposal of petrochemical waste bottoms in unlined pits and decant effluents down

deep well injection systems (up to 750 foot depths). The site is near Padilla Bay in Washington and groundwater is tidally influenced. The RFI is focusing on groundwater pathways to the Bay and natural attenuation mechanisms to determine ecological risks. Several years ago, he has been the project manager of four non-time critical CERCLA investigations and remediation of base-metal mine and mill wastes in the South Fork Coeur d'Alene River Valley in Idaho. Efforts have involved remediation of about 300 thousand cubic yards of tailings impacted (Pb, Zn and Cd) soil, the development of riparian habitat and stabilization of the river within the impacted areas. Dr Morell designed a 1400 foot long groundwater hydraulic barrier and passive groundwater treatment vault system for heavy metal removal at the Success Mine site.

Dr. Morell has conducted numerous evaluations of environmental liabilities and associated costs for property transactions. He was a team member in determining the environmental liabilities associated with the acquisition of an industrial complex (uranium hydrometalurgical plant, acid plant, coal-fired power plant and two uranium mines) in Kazakhstan for a North American venture. Dr. Morell worked with the buyer and seller of an ammonia and methanol manufacturing plant in British Columbia, where he is determining environmental liabilities and anticipated remediation costs for the transaction. Dr Morell recently completed and assessment of environmental liabilities associated with an oil company portfolio including a refinery, six bulk storage terminals, 250 miles of pipelines and 140 gasoline stations.

Assisted Westinghouse with their environmental restoration efforts at the Hanford Reservation. Project manager on "Macro Engineering" approaches to site-wide remediation of contaminated aquifers at Hanford. Several CERCLA Operable Unit RI/FS were completed under the management of Dr. Morell at Hanford Nuclear Reservation in Washington, which involved subsurface vadose and groundwater fate and transport analyses of metals, radioactive isotopes and chlorinated solvents. Project manager and technical leader on the development of the RI/FS reports for radioactive/mixed waste CERCLA 200-BP-1 and 300-FF-5 Operable Units at Hanford.. He has been a member of the Hanford Ground Water Modeling Committee, who was tasked with identifying appropriate codes and strategies for predicting contaminant migration in the subsurface environment for Hanford CERCLA RI/FS documents.

1981 - 1982 **University of Idaho** **Moscow, Idaho**

Dr. Morell was a faculty member at the University of Idaho, College of Mines. He taught undergraduate and graduate courses in hydrology, hydrogeology and hydrochemistry during 1981 and 1982.

1975 - 1981 **PEI Environmental** **Cincinnati, Ohio**

Waste disposal studies for the phosphate rock chemical processing industry at 13 sites, hydrogeologic characterization and surface water/groundwater monitoring at 65 mine sites including copper, gold, lead/zinc, phosphate, and uranium; managed the clean-up from leaking underground petroleum fuel tanks. Assessed waste disposal activities and site conditions at the Homestake Mine's cyanide tailings pond in Lead, South Dakota. Conducted a RI/FS at a organic chemical production plant in Cincinnati, Ohio. Managed an enforcement action for EPA/NEIC where PCB oils and chlorinated solvents (TCE, PCE) were injected into a 3,000-ft deep aquifer in East St. Louis, Illinois. Provided expert testimony on behalf of EPA during litigation with Con Edison of New York, pursuant to the Clean Water Act.

Douglas J. Morell

LITIGATION EXPERTISE AND EXPERIENCE

Dr. Morell has provided expert testimony during litigation between the Region II EPA and electric utility companies (ConEdison of New York, Orange & Rockland and Power Authority of New York) with power plants along the Hudson River. The case was active during the late 1970's and involved impacts to the Hudson River under the auspices of Section 316(B) of the Clean Water Act.

Dr. Morell was the Chief Investigator in a criminal action in 1983 where solvents and PCBs were illegally disposed through an injection well into an aquifer 3000 feet below land surface in east St. Louis, Illinois. The criminal action was conducted by the National Enforcement Information Center (NEIC) of the EPA under TSCA.

He has also provided depositions in a civil case (confidential client) in the late 1980s involving the evaluation of pre-existing environmental conditions and impacts in a property transfer of an automobile dealership and repair shop in the Seattle metropolitan area, where sub-surface contamination was discovered after the property transfer ownership.

In 1995, Dr. Morell provided depositions during civil litigation involving health impacts and odor nuisances to residents living above an old inactive landfill called the Norseland Mobile Estates (Coleman et al. vs. Port of Bremerton et al., 1994). The main concern of the case involved the existence and migration of landfill gases into breathable ambient and in-door air. Background ambient air studies and ambient air monitoring of odor events were completed to identify whether the landfill at Norseland was the source.

Dr. Morell provided expert review and affidavits for litigation between Lockheed Aeronautical Systems Company and Moore Drums in Charleston, South Carolina in 1996. Provided expert opinion on the fate and migration of chlorinated solvents in the groundwater and emissions to the atmosphere for health risk to on-site employees.

Dr. Morell has provided expert oversight for litigation on a Home Depot facility in 1999. This case involves damage to a new Home Base building where the subgrade fill material was fly ash originating from coal fired power plants. Damage was allegedly caused by fly ash swelling from the formation of hydrated minerals reacting with moisture. The one year old 130,000 sq. ft. building has recently been demolished and will be replaced. Dr. Morell's involvement is to statistically design a sampling and analysis program to characterize the fly ash materials underlying the building for data to be used during litigation.

In 1998, Dr. Morell has provided expert report for Kitsap County on residual contamination at the Crown Hill School in Kitsap County, Washington. The report provided an opinion on the potential liability associated the contamination from past ownership of the site.

Dr. Morell provided expert analysis and assessment of the potential for multiple volatile chlorinated fumigants to impact municipal water supply wells in Oahu, Hawaii in fall 2000. This effort was in response to the formulation of liable parties of current and future impacts to major well fields from fumigants used in agricultural fields on the island. Evaluation involved fate and transport analyses and groundwater flow system delineation for the west region of the island. An assessment was made of influence from pumping supply wells on contaminant migration toward the wells.

In 2001, Dr. Morell was retained for depositions on the Natural Resource Damage Assessment litigation (United States vs. ASARCO et al.) on behalf of the defendants. The case involved environmental impacts and damages from mining practices during the last century to the Coeur d' Alene River and basin.

Douglas J. Morell

In the summer of 2002, Dr. Morell was retained for expert testimony for a defendant on impacts to a private groundwater supply well from leaking underground fuel storage tanks in Texas. His testimony was focused on the fate and transport of petroleum hydrocarbons potential to impact the water from the supply well. This case was settled before trial.

Dr. Morell has provided expert affidavits and depositions in Fall 2002 for a plaintiff whose groundwater supply was threatened by contamination from chlorinated solvents from defendant's operations. The well supply system has a capacity of 40 million gallons per day for a public of about a million people. The case settled shortly after trial began.

Dr Morell was retained as an expert witness in 2003 for a defendant associated with dry cleaning equipment. Groundwater in this California city has been impacted with PCE and threatens the City's well water supply system. The current plans are to conduct sufficient investigations to determine the cause of the impacts, evaluate appropriate remedial measures and estimate remedial action costs for litigation with the plaintiff.

Currently, he has been retained as an expert to review soil remediation of petroleum hydrocarbons using amendments.

Bryony Stasney

Education: B.Sc., (First Class Hons.), Geology, Imperial College, London, United Kingdom, 1991.
M.Sc., Hydrogeology, University of British Columbia, Vancouver, BC, 1994.

Affiliations: Licensed Hydrogeologist in Washington.
Fellow, Geological Society of London, United Kingdom.
President (2007) & Board Member, Society of Inland Northwest Environmental Scientists
Technical Advisory Committee, Spokane Valley Rathdrum Prairie Aquifer Bi-State Study

Experience:

1998 to date **Golder Associates** **Redmond, WA (1998 to 2000)**
Coeur d'Alene, ID (2000 to present)

Senior Project Hydrogeologist
Responsible for hydrogeologic characterization studies for watershed assessments and groundwater supply development and protection, including data compilation and assessment, field oversight of drilling, well and piezometer installation, surface water and groundwater sampling, collection and analysis of water quality and aquifer test data, data analysis and interpretation using analytical and numeric computer models and reporting. Also responsible for coordinating and facilitating watershed planning projects in eastern Washington, including scoping and completion of technical tasks and working with diverse stakeholder groups to develop watershed scale management plans.

1997 **School of Engineering Technology** **Vancouver, British Columbia**
Instructor
Instructor at the British Columbia Institute of Technology for "Environmental Controls for Landfills", a B.Eng. credit course covering landfill leachate and gas generation, containment and collection, field investigation and monitoring techniques.

1995 - 1997 **Sperling Hansen Associates Inc.** **North Vancouver, British Columbia**
Hydrogeologist
Responsible for technical development and project management of hydrogeological investigations, design and operation plans and closure plans for landfills across British Columbia. Responsibilities included proposal preparation, development and completion of field studies, data analysis, report writing and presentation.

1995 **Gartner Lee Ltd.** **Vancouver, British Columbia**
Hydrogeologist
Responsible for field supervision of drilling and test pitting, groundwater monitoring well installation and sampling, data collection and analysis, and report writing on environmental site assessment projects for private, corporate and public sector clients.

1994 **Bullmoose Coal Mine** **Tumbler Ridge, British Columbia**
Student
Haul truck operator and research student for Master's project on the viability of an engineered wetland system to reduce elevated levels of nitrate within coal mine effluent.

1992 **Mott MacDonald** **United Kingdom**
Trainee Geotechnical Engineer

Bryony Stasney

SELECTED PROJECT EXPERIENCE

SITE CHARACTERIZATION AND REMEDIATION

Pend Oreille Mine Remedial Investigation / Feasibility Study Metaline, Washington
Senior Hydrogeologist responsible for public outreach planning and informing the public at each key step in the investigation and cleanup of two inactive tailings disposal facilities.

City of Moses Lake, RI/FS Moses Lake, Washington
Project Hydrogeologist for an MTCA RIFS conducted under an Agreed Order with Ecology. Responsible for workplan development, field work (groundwater sampling, test pitting, drilling and monitoring well installation, geoprobes), data analysis and reporting.

GE Spokane, Groundwater Monitoring Spokane, Washington
Project Hydrogeologist responsible for on-going quarterly groundwater sampling for PCB compliance monitoring at a WA State Superfund site.

Success Mill Groundwater Capture and Treatment Wallace, Idaho
Project Hydrogeologist working with the Success Planning Team (Silver Valley Natural Resource Trustees, local, state and federal agencies, the Coeur d'Alene Tribe and the public) to develop the optimum response alternative to minimize migration of heavy metals into the creek downgradient of a 200-350,000 cubic yard tailings pile. Responsible for data collection and analysis, report preparation and presentation of the findings to the Success team and to the public.

WATERSHED PLANNING

Watershed Assessments, WRIA 55 and 57 Spokane, Washington
Project Hydrogeologist for the WRIA 55 and 57 (Little Spokane and Middle Spokane watersheds) Planning Unit. Responsible for data collection and analysis for geologic and hydrogeologic information relevant to the watersheds, report preparation and presentation of the findings to the Planning Unit.

GROUNDWATER SUPPLY MANAGEMENT

Spokane County Water District #3, Municipal Supply Well Pullman, Washington
Senior Hydrogeologist and project manager responsible for data review and analysis for siting, drilling and installation of a new municipal groundwater supply well for Spokane County Water District #3.

City of Pullman, New Municipal Supply Wells Pullman, Washington
Completed hydrogeologic data review and analysis for siting new municipal groundwater supply wells for the City of Pullman and responsible for drilling, sampling, installation and testing oversight for the new well.

John R. Swift, P.E.

Education: A.A.S., Civil Engineering Technology, Mesa College, 1985
B.S.C.E.T., Civil Engineering Technology, Oregon Institute of Technology, 1988
Post Graduate Studies, Construction Engineering, University of Washington

Affiliations & Certifications; Registered Professional Civil Engineer (Washington, Oregon, Idaho, and Montana)
American Society of Civil Engineers (Member)
Construction Institute
Geo Institute
40 Hour OSHA Hazardous Materials Training.
MSHA Mine Safety Training
U.S. Army Corps of Engineers "Construction Quality Management for Contractors"

Experience:

2005 to Present **Golder Associates** **Coeur d'Alene, Idaho**
Senior Engineer
Project manager and design engineer for geotechnical and environmental projects for residential and commercial developments. Performs engineering economic analysis for landfill permitting. Design and construction documentation preparation for landfill, land development, environmental, and mining projects. Manages geotechnical investigations and evaluations for residential, commercial, and industrial development. Supervises interdisciplinary staff. Performs marketing and client development duties.

1988 to 2005 **Golder Associates** **Redmond, Washington**
Staff Engineer to Senior Project Manager/Engineer
Design and construction documentation preparation for landfill, environmental, and mining projects. Manages construction observation and Construction Quality Assurance/Control projects associated with the construction of landfills, deep excavation shoring systems, mines as well as site development. Manages geotechnical investigations and evaluations for residential, commercial, and industrial development. Also manages the design of mechanically stabilized earth (MSE) and gravity wall retaining wall systems.
Prepares, implements, and manages project health and safety plans.

SELECTED PROJECT EXPERIENCE

Weyerhaeuser Paper/Lumber Mill Remediation — Everett, Washington
Mr. Swift was the General Contracting Superintendent for the remediation of hydrocarbon, PCB, and wood preservative contaminated soils during the decommissioning and demolition of a paper and lumber mill located on the Snohomish River. The remediation consisted of determining the extents of the contamination with field laboratory analysis, excavating the contaminated soil, and shipping it to authorized landfill facilities in eastern Washington and Oregon.

The Reserve at Newcastle, Boitano Construction — Newcastle, Washington
Single family residential development. Methane mitigation and venting design for construction of several new houses over coal beds and in the vicinity of a closed landfill.

John R. Swift, P.E.

Black Bird Mine Reclamation **Cobalt, Idaho**

Mr. Swift was a Design Engineer, Field Engineer, and CQA Site Manager for the Blackbird Mine reclamation for Noranda Mining near Cobalt, Idaho. Also was the Health and Safety Officer for Golder site personnel.

Success Mine Reclamation **Wallace Idaho**

Mr. Swift was a Design and CQA Manager for a semi-passive groundwater treatment project associated with the reclamation the Success Mine waste rock dump north of Wallace, Idaho.

Interstate Mine Reclamation **Kellogg, Idaho**

Mr. Swift was the CQA Manager for the construction of a low permeability cover over waste rock at the Interstate Mine in the Kellogg, Idaho area.

White King and Lucky Lass Mines Superfund Site **Lake County, Oregon**

Mr. Swift was the Safety Manager and Certifying Engineer for the remediation ad closure of two uranium mines. Mr. Swift administered the Golder Site Safety Program and reviewed all construction quality assurance work and environmental evaluation and monitoring at the site. He also reviewed and commented on contractor submittals, RFIs, operations plans, and design modifications.

Richard E. Sylwester

Education: B.S., Geological Oceanography, University of Washington, 1969.
M.S., Engineering Geophysics, University of Washington, 1971.

Affiliations: Environmental and Engineering Geophysical Society
Association of Engineering Geologists
American Society of Civil Engineers
Society of Exploration Geophysicists
Marine Technology Society

Registrations: Registered Geologist State of Washington (No. 2445)
Registered Engineering Geologist State of Washington (No. 2445)

Experience:

1991 to date **Golder Associates** **Redmond, Washington**
Associate-Senior Marine Geophysicist
Mr. Sylwester is an engineering geophysicist with over 37 years of experience in all aspects of geophysical operations. At Golder he is responsible for directing and supervising terrestrial, borehole and offshore geophysical investigations. He has been responsible for planning, conducting and analyzing geophysical data from over 350 projects where the mapping of subsurface contaminants, utilities, fuel lines, underground storage tanks and miscellaneous buried debris was the primary project objective. He has extensive experience in the operations, acquisition and analysis of data obtained with ground penetrating radar, magnetometers/gradiometers, utility locators, time and frequency domain electromagnetic systems, seismic refraction and reflection systems, and electrical resistivity imaging systems. In addition he has been the project director responsible for geophysical investigations using borehole logging methods for ground water studies and mapping contaminant plumes. He has directed geophysical investigations related directly to environmental remediation at over 15 military bases, 60 industrial sites, and 15 municipal landfills.

1987 - 1991 **Williamson & Associates, Inc.** **Seattle, Washington**
Senior Geophysicist
Responsible for planning, conducting and analyzing data for over 100 geophysical surveys for geotechnical, geohazard and environmental projects

1982 - 1987 **Northern Technical Services** **Redmond, Washington**
Senior Geophysicist
Conducted more than 150 marine and terrestrial geophysical surveys for geohazard studies, for remediation of industrial sites, investigations of landfills, and hazardous waste sites and marine pipeline corridors, port and harbor development,

1976 - 1982 **U.S. Geological Survey** **Woods Hole, Massachusetts**
Chief of Marine Operations
Directed the Marine Operations Group that provided vessels and technical support for marine studies on the U.S. Atlantic Coast and Gulf of Mexico. Responsible for specifying and purchasing geophysical equipment, planning and conducting marine surveys, performing data analysis and preparation of final reports.

Richard E. Sylwester

REPRESENTATIVE TERRESTRIAL GEOPHYSICAL PROJECT

George AFB — California

A comprehensive terrestrial geophysical investigation was conducted on over 200 acres of George AFB under the supervision of Mr. Sylwester. A preliminary investigation using ground-penetrating radar, magnetometry, and electromagnetic induction was conducted to locate possible areas of buried waste. Following analysis of the data from this survey a detailed geophysical survey was conducted in those areas to accurately define the lateral boundaries and thickness of waste materials. Additional borehole geophysical investigations were conducted in conjunction with installation of monitoring wells to assess levels of contamination.

North Market Street Investigation — Spokane, Washington

A comprehensive geophysical investigation was directed and conducted by Mr. Sylwester and three geophysicists in the Hillyard Area of Spokane. The objectives of the study were to map subsurface debris, buried tar pits, and utilities at a bulk fuel distribution depot, and an abandoned oil refinery.

Mica Landfill Investigation — Spokane, Washington

Mr. Sylwester developed the geophysical work plan, supervised the field investigations and performed the data analysis for this 200-acre NPL site. The geophysical investigation used ground-penetrating radar, electromagnetic induction, resistivity, and seismic refraction and borehole electromagnetic induction. Results from the geophysical data were used to select locations for the placement of monitoring wells.

Grand Forks AFB Investigation — Grand Forks ND

A geophysical investigation was undertaken on a 130-acre site within the New Sanitary Landfill Area (NSLA) at Grand Forks AFB to locate the lateral extent of buried landfill cells and to locate buried ferrous objects that may represent drums containing hazardous materials. Golder geophysicists used terrain conductivity surveys to locate the limits of buried waste and a magnetometer/gradiometer to locate buried ferrous metal. Terrain conductivity surveys used both quadrature and in- phase measurements obtained by electromagnetic induction. The survey was designed with a grid size that had nearly a 100% probability of locating landfill cells greater than approximately 25 feet by 25 feet, which were confirmed by subsequent drilling.

Homestead AFB Investigation — Idaho

Geophysical investigations were undertaken at four sites on Homestead AFB to locate buried ferrous objects and to determine the lateral and vertical extent of buried waste. A GEM GSM-19 and an EM-31 terrain conductivity meter were used as reconnaissance tools to locate zones of anomalous conductivity or magnetic field changes. GPR was used in the anomalous zones to further define the anomalies and to determine the depth of any landfill materials.

USACOE Whittier Harbor Investigation — Whittier, Alaska

A geophysical investigation was performed at the Whittier Harbor in Whittier, Alaska. The investigation used EM-31, EM-61, magnetrometry, ground penetrating radar, and seismic refraction to characterize subsurface conditions for the proposed harbor expansion. Of particular interest was the depth to bedrock, depth to the water table, the presence of debris, soil contamination, and the location of utilities. Areas of anomalous EM, magnetometry, and GPR response were interpreted as suspected locations of buried debris. The water table was detected with seismic refraction and interpreted to be 20-25 feet deep. GPR and Radiodetection data were used to construct a utility location map for the site.

Richard E. Sylwester

DOE Investigations **Continental US**

Conducted geophysical investigations to locate and mapped buried debris, both ordnance and potential contaminants, on numerous military facilities and Department of Defense sites throughout the US. Some of these sites include Los Alamos National Lab, Idaho National Engineering Lab, Hanford Nuclear Reservation, Fairchild AFB, Umatilla Army Deport, Kirtland AFB, Navy Homeport Everett, Bangor Nuclear Submarine Facility and Keyport Naval Facility.

USACOE-Presidio **San Francisco, California**

Mr. Sylwester was Project Manager and Senior Geophysicist for an extensive ground penetrating radar survey to locate and map subsurface utilities, fuel lines, and abandoned fuel tanks on this 500 acre site.

WSDOT On-Call Geophysical Contract **Washington State**

Under Mr. Sylwester's direction Golder Associates was awarded a second 2 year on-call contract to provide geophysical services for Washington State Department of Transportation in support of design and construction of new bridges, roadway projects, evaluation of potential roadway failures resulting from earthquakes; and design of embankment structures and rock wall cuts. The geophysical work is supervised by Mr. Sylwester who also conducts a significant portion of the offshore field work in addition to conducting terrestrial and borehole geophysics (seismic refraction and reflection, borehole P and W wave studies, optical televiewer imaging, electrical resistivity imaging, ground penetrating radar and SASW).

Paul E. VanMiddlesworth

Education: B.Sc., Geology, University of Tennessee, Knoxville, 1992
M.Sc., Geochemistry, University of Idaho, Moscow, 1996

Experience:

2005 to Present **Golder Associates** **Coeur d'Alene, Idaho**
Project Geochemist
Mr. VanMiddlesworth has conducted environmental investigations for private, corporate, government and tribal sectors for over 10 years. Current responsibilities include developing technical work plans for field investigations, hydrogeochemical assessments, Phase I Due Diligence assessments, remedial action operations and corrective action plans, as well as preparing health and safety plans and regulatory permits. Other duties include overseeing environmental and geotechnical drilling, borehole logging, design and construction of monitoring wells and piezometers, seep sampling, groundwater monitoring, soil excavation, wetland delineation, dynamic cone penetrometer testing, data management, and reporting. Mr. VanMiddlesworth also conducts contaminant pathway migration analyses to assess the aqueous solubility of metals, plume migration dynamics, and potential health hazardous to humans and environmental receptors.

2003 – 2005 **URS Corporation** **Spokane, Washington**
Senior Geologist / Environmental Scientist
Developed site work plans, project proposals, data quality objectives, quality assurance project plans, and strategic planning for site investigations and hydrogeochemical assessments at RCRA sites, timber facilities, public utilities, and air force bases. Supervised environmental/geotechnical drilling activities, monitor well installation, hydropunch sampling, groundwater monitoring, soil excavation, and wetland delineation. Maintained soil bioventing systems and air sparging wells at petroleum remediation sites.

2000 – 2003 **Geomega Environmental Consultants** **Boulder, Colorado**
Staff Geochemist
Developed field sampling and analytical plans, monitoring well design and installation, installed multi-level piezometers, evaluated fate and transport of contaminants, and generated technical reports. Oversaw drilling activities, downhole-geophysics programs, borehole logging, and soil/groundwater sampling. Specialized duties included use of field spectrometer, regulatory compliance audits, hydrogeochemical modeling, bench-scale roll-type batch tests, column leaching experiments, and geochemical forensics.

1998 – 2000 **Brown and Caldwell** **Denver, Colorado**
Associate Geochemist
Performed Phase I/II ESAs, supervised geotechnical/environmental drilling, borehole logging, soil/groundwater sampling, soil excavation, data validation, and database design/management. Other duties included monitoring cement kiln dust landfill sites, geochemical modeling, and proposal preparation.

1997 – 1998 **Environmental Management Consultants** **Grants Pass, Oregon**
Laboratory Technician / Environmental Scientist
Performed groundwater and stormwater monitoring at timber industries, mine sites, and municipal landfill facilities. Oversaw Phase I/II ESAs, asbestos abatement, soil excavation, and data management activities. Responsible for operation and maintenance of laboratory analytical equipment (GFAAS, GC, UV-Visible Spectrometer).

Paul E. VanMiddlesworth

ENVIRONMENTAL PROJECT EXPERIENCE

Moses Lake City Maintenance Facility Corrective Action Moses Lake, Washington

Supervised and implemented excavation and remediation of soil and groundwater impacts related to petroleum hydrocarbon release(s) from former site underground storage tanks, motor oil disposal and equipment cleaning activities. Primarily responsible for soil sampling and analysis, data evaluation, stormwater management activities, coordination of haul trucks, monitor well installation, schedule site visits with Washington Ecology representative, and collect soil and groundwater confirmation samples following remedial activities.

Groundwater Monitoring at CERCLA Site Spokane, Washington

Supervise quarterly groundwater monitoring program and perform maintenance tasks at General Electric former transformer service shop. Collect groundwater samples for analysis of PCBs, measure water levels, assimilate field and analytical data, develop potentiometric maps, and produce quarterly and annual technical reports.

Soil and Groundwater Remediation Activities Spokane, Washington

Monitored groundwater air sparging wells and soil bioventing systems for Priority 1 and 2 Sites at Fairchild Air Force Base to remediate subsurface petroleum impacts and comply with the Air Force Center for Environmental Excellence (AFCEE), Washington State Department of Ecology (WDOE), Spokane County Air Pollution Control Authority (SCAPCA), and U.S. EPA environmental regulatory requirements. Per ROD directives, managed the collection of soil-gas samples from vapor monitoring points, maintained soil bioventing wells, installed groundwater monitoring wells, collected groundwater hydropunch samples, installed soil borings, and delineated dissolved-phase and free-phase LNAPL and DNAPL plumes.

Remedial Investigation/Feasibility Study Metaline Falls, Washington

Installed a multitude of test pits, directed drilling of investigation boreholes, designed and constructed monitoring wells, logged borehole cuttings and split-spoon samples, and supervised field activities to collect groundwater, surface water and sediment samples at historic tailings disposal facilities at the Pend Oreille Lead-Zinc Mine. Performed pump-test and slug-tests to characterize the hydrogeologic conditions of the tailings material, assisted in vegetation and agronomic sampling to determine uptake and bio-availability of metals, and monitored temporal changes in groundwater chemistry and potentiometric levels.

Pasco Bulk Fuel Terminals Site Pasco, Washington

Performed groundwater monitoring activities at former bulk fuel site located on the Columbia River, including collecting groundwater samples for analysis of petroleum hydrocarbons, sounding static water level in monitoring wells, and measurement of field geochemical parameters.

Former Chevron Refinery Remedial Investigation Kenai, Alaska

Installed multiple piezometers in a 900-foot Groundwater Recovery System at the base of a sea bluff to characterize the geologic continuity of in-situ aquifer units, monitor groundwater and LNAPL recovery, and determine oil plume migration pathways, including a multi-level piezometer to monitor differential dissolution of hydrocarbons in groundwater. Collected transducer data to monitor the tidal flux of the Cook Inlet on groundwater flow and plume migration. Installed groundwater monitoring wells and collected in-situ soil samples from an oily waste impoundment area. Performed bail-down tests in wells containing free hydrocarbon product to estimate plume migration rate, performed rising-head displacement (slug) tests and pumping test to determine aquifer hydraulic characteristics, characterized hydrocarbon products in groundwater using geochemical forensics techniques, and produced animated sequence of free product plume migration. Coordinated efforts with Chevron Environmental Management and Alaska Department of Environmental Quality to develop risk-based cleanup levels and determine remedial options.

Paul E. VanMiddlesworth

Subsurface Investigation of Wrecking Yard **Ponderay, Idaho**

Installed auger borings and temporary groundwater monitoring wells to assess the nature and extent of hazardous substances and petroleum product surface releases from car crushing activities at the site. Responsibilities included establishing a sampling grid over the target area, advancing hand-auger borings to approximately 15-feet bgs at the grid nodes, field-screening of soil samples using a photo-ionizing detector (PID) using a headspace analytical method, logging subsurface soil conditions, collecting representative surface and subsurface soil and groundwater samples to characterize any releases, and submitting a final report to Idaho Department of Environmental Quality (DEQ).

RCRA Site Investigation and Corrective Measure Study **Omak, Washington**

Performed Site Investigation at Colville Indian Power and Veneer facility to comply with U.S. EPA and Colville Tribal Environmental Trust Department CAOC environmental investigation requirements. Activities included designing and installing groundwater monitoring wells, subsurface geophysical survey, in-situ aquifer testing, geotechnical borings, historical records review, regulatory compliance audit, soil/groundwater baseline studies, and soil/groundwater sample collection. Set-up database and evaluated remedial options and activities as part of risk-based corrective measure study to reduce potential exposure of petroleum-impacted soils to on-site workers and local wildlife.

Fluid Removal and Environmental Compliance Audit **Inchelium, Washington**

Developed fluid management plan for Inchelium Tribal Wood Treatment Plant to comply with environmental requirements ordered by U.S. EPA and Colville Tribal Environmental Trust Department CAOC. Pumped 60,000 gallons of copper-chromated-arsenic (CCA) effluent wastewater from ASTs and USTs for treatment and disposal, developed a stormwater management plan to eliminate CCA effluent generation, performed environmental compliance audit, and formulated a corrective measure plan for facility to utilize remaining fluids and mitigate groundwater plume migration.

Cyanide Heap Leach Pad Closure **Bald Mountain, Nevada**

Wrote Environmental Assessment for closure of cyanide heap leach pad at Bald Mountain Mine in Nevada. Reviewed RI/FS for site, evaluated heap draindown and effluent management strategies, assessed the affected environment and environmental consequences, proposed mitigation measures, recommended monitoring programs, and worked closely with Nevada BLM regulators.

Former Chromite Ore Refinery Site Characterization **Jersey City, New Jersey**

Collected in-situ samples of sediments, organic meadow mat, and chromium ore processing residue (COPR) using double-cased hollow stem auger with a direct push split-spoon core barrel, installed temporary piezometers with a geoprobe, collected groundwater hydropunch samples, analyzed groundwater samples for Cr^{III} and Cr^{VI} using a HACH field spectrometer, retrieved soil samples and constructed soil columns to perform laboratory bench-scale leachability tests and roll-type batch tests. All field and laboratory results were used for legal support and evidence in expert witness litigation and testimony.

Groundwater Hydrogeologic Investigations **Bakersfield, California**

Directed drilling of soil borings and installation of groundwater monitoring wells for groundwater hydrogeologic investigation and monitoring of oil-field water disposal activities in Bakersfield, Cymric, Maricopa, Taft, Lost Hills, and Belridge Oil Fields. Developed monitoring program for ChevronTexaco, Aera, Valley Waste Disposal Company, and California Regional Water Quality Control Board to monitor groundwater mounding effects from percolation ponds and injection wells. Continuous soil cores were retrieved using a reverse-rotary mud drilling rig with a 94-mm Christensen core barrel, soil cores were logged and preserved for geophotography, and open-borehole geophysics was performed. Groundwater samples were collected and analyzed, and field hydraulic conductivity (slug) tests were performed. Responsible for data analysis, geophysical log interpretation, preparation of technical reports, and incorporation of hydrogeologic data into a 3-D EVS groundwater flow model and the Southern San Joaquin Valley regional groundwater monitoring database system.

Charles C. Haury, M.S., CIH, CSP

Education: M.S., Occupational Health Drexel University, 1981
B.S., Biology Florida Institute of Technology, 1977

Affiliations/Certifications:

American Industrial Hygiene Association (AIHA)
Florida Section Executive Committee (President 2000-2001)
Certified Industrial Hygienist (#2229)
Certified Safety Professional (#11000)
Licensed Asbestos Consultant in Florida (IA0000006)

Experience:

1996 to date **Golder Associates** **Jacksonville, Florida**
Corporate Health and Safety Officer / Consultant Scientist – Compliance Programs.
Maintains a diverse practice in occupational safety and health throughout Florida. Provides marketing and technical support for all Florida offices. Specialty areas include indoor environmental quality, hazardous waste safety and health programs, industrial hygiene, occupational safety, and asbestos and lead-based paint management. As the Corporate Health and Safety Officer, manages the corporate safety program for 700 employees in over 25 offices.

1994 to 1996 **KBN Engineering and Applied Sciences, Inc.** **Jacksonville, Florida**
Regional Office Manager.
Initiated the Jacksonville regional office in 1994. With a staff of five professionals, provided industrial hygiene, safety, audits, aquatic toxicology and assessments in Florida and the Caribbean basin.

1991 to 1994 *Senior Scientist.*
Manager of industrial hygiene services for KBN. Provided technical and marketing support for all KBN offices.

1989 to 1991 **Environmental Science and Engineering, Inc.** **Gainesville, Florida**
National Program Manager.
Managed a national sales and technical support effort for ESE's 1,700 employees in 30 offices for the asbestos, lead and industrial hygiene program.

1986 to 1989 *Division Manager of Industrial Hygiene.*
Managed a division of two departments and a total of 10 staff members. Performed industrial hygiene services for clients throughout Florida.

1983 to 1986 *Department Manager of Industrial Hygiene.*
Department and project manager for a variety of industrial hygiene projects including asbestos, air sampling, ventilation, noise, indoor air quality and training.

1978 to 1983 **Harshaw Chemical Company** **Gloucester City, New Jersey**
Environmental Control Supervisor.
Managed air pollution program including source testing and inventory, air permits, SO2 and particulate scrubber monitoring instrumentation. Interface with EPA and state officials during compliance inspections. Designed and instituted industrial hygiene evaluation of new processes; design of ventilation systems; air sampling for metals, organics, and asbestos; extensive work with OSHA regulations and compliance.

Charles C. Haury, M.S., CIH, CSP

PROJECT EXPERIENCE - HAZARDOUS WASTE/MATERIAL MANAGEMENT

Corporate Health and Safety (GAI) **USA and Canada**

Provides corporate health and safety support for compliance with HAZWOPER requirements. Support includes teaching 8-hour refresher courses and reviewing and preparing health and safety plans (HASPs). Coordinates national network of office health and safety coordinators (HSC).

University of Florida **Gainesville, Florida**

Responsible for the identification and disposal of several thousand unknown waste chemicals from the University of Florida's research laboratories. Project included the use of field screening techniques to fingerprint chemicals for safe disposal. A system was developed to include a sequence of field screening stations along which samples were moved until they were sufficiently identified for disposal. Classes of chemicals identified included flammables, reactives, toxics, caustics, acids, and chlorinated compounds.

State of Florida Department of Environmental Protection **Various Locations, Florida**

Remedial Investigations/Feasibility Studies at State Hazardous Waste Sites - Work conducted for Florida Department of Environmental Protection (FDEP) at 22 sites identified as being potentially hazardous. The results of these investigations and a discussion of alternative remedial actions were presented in a Final Report.

USATHAMA Rocky Mountain Arsenal **Denver, Colorado**

Responsible for all the safety and health aspects of a remedial investigation for USATHAMA. A variety of instruments used to detect toxic compounds.

United States Environmental Protection Agency **Seymour, Indiana**

Monitored air during drilling operations at a Superfund site. Provided site-specific training to new personnel.

USATHAMA **Charleston, West Virginia**

Involved 29,440-man-hour comprehensive environmental contamination survey, assessment and remedial alternatives analysis (RI/FS) program for the CERCLA (Superfund) site, ranked 86th on the National Priorities List (NPL)

University of Florida **Various Locations**

Forty-Hour Hazardous Materials/Site Investigation Course, Instructor-Course covers all aspects of hazardous waste/materials site safety. The course includes lecture-type instruction, hands-on sessions, field exercises, and examinations.

Charles C. Haury, M.S., CIH, CSP

PROFESSIONAL EXPERIENCE - WORKPLACE ASSESSMENTS

Confidential Client, Concrete Pipe Manufacturer

Retained by the client's attorney to provide OSHA litigation support. Comprehensive confined space and lock-out/tag-out programs were compiled and delivered to the client at the manufacturing location. Air sampling was complete for silica generated as the result of grinding activities. Dosimeter studies were completed to assess the noise exposure of facility employees. Rapid completion of these studies allowed the client to minimize the impact of OSHA citations.

Jacksonville Electric Authority — Jacksonville, Florida

Performed comprehensive personal protective equipment (PPE) assessments for all power, water and waste treatment facilities. Extensive tables were compiled that indicated the hazards and appropriate matching PPE. Other studies included safety assessments to determine OSHA compliance and review of the JEA arsenic program.

U.S. Filter Corporation — St. Augustine, Florida

Performed an industrial hygiene assessment of a filter extrusion operation in St. Augustine, Florida. Air samples were collected for trimethylamine, styrene, and divinyl benzene. Recommendations were also made for improvement of the local exhaust system used to ventilate the work area.

Maidenform — Jacksonville, Florida

Collected air samples for NO_2, ammonia and amines. Employees had complained of irritation during a molding process in which a visible plume was produced. Ammonia was detected and recommendations were made to modify the existing local exhaust by moving the collection system closer to the molding machine.

Confidential Client, International Airport

Retained by the County Attorney's Office to provide air monitoring services in the airport complex. Air samples were collected on a continuing basis for carbon monoxide, polynuclear aromatic hydrocarbons, and particulate matter. The arrival area of the airport is semi-enclosed and pollutant dispersal is slow. Specific recommendations were made to reduce air pollutants in the arrival area through mechanical ventilation, use of cleaner fuels, and traffic management.

Vistakon (Johnson and Johnson) — Jacksonville, Florida

Comprehensive measurements were taken of methyl chloroform in a contact lens manufacturing plant. Studies indicated the need for both engineering and work practice controls. Provided recommendations for exhaust ventilation and generated a hood design used by the client. Also provided safety and health audit of all facility operations.

Savannah Electric Audit Protocol Document — Savannah, Georgia

Project included reviewing plant operations and existing permits to evaluate compliance with all applicable federal and state environmental regulations. A protocol document was developed for the company as a guide for future in-house environmental audits. A comprehensive industrial hygiene audit criterion was included.

Northern Telecom — West Palm Beach, Florida

Collected air samples for Pb and Cellosolve® compounds in a circuit board manufacturing area. Provided recommendations for contaminant control through ventilation additions.

Charles C. Haury, M.S., CIH, CSP

Wenczel Tile Company **Tampa, Florida**

Developed air sampling data for respirable silica dust in a ceramic tile manufacturing facility. Proposed engineering controls to reduce silica exposure. Worked with client attorney to defend OSHA citation and compliance schedule.

Bear Archery **Gainesville, Florida**

Provided client with a comprehensive safety and industrial hygiene audit. Audit checklists were utilized to gauge compliance with OSHA and state regulations.

Rayonier, Inc. **Baxley and Jesup, Georgia, Fernandina Beach, Florida**

Comprehensive industrial hygiene services at multiple locations. Services included: air sampling, ventilation assessments, indoor environmental quality and noise assessments. Facilities include sawmills and pulp mills.

E.I. DuPont DeNemours, Inc. **Starke, Florida**

Provided various industrial hygiene and safety services. Laboratory hood surveys, silica air monitoring, ceramic fiber assessments, noise assessments, respirator fit testing, and breathing air measurements were conducted.

Charles C. Haury, M.S., CIH, CSP

PROFESSIONAL EXPERIENCE - ASBESTOS AND LEAD-BASED PAINT MANAGEMENT

St. Johns River Water Management District **Eustis, Florida**
Performed asbestos and lead-based paint assessments for 35 buildings with a total of about 300,000 ft^2. The project was performed on a compressed time schedule to meet the requirements of land purchasing by the District. Recommendations for abatement were made and costs were calculated for remediation.

Atlanta Testing and Engineering **Jacksonville, Florida**
Provided licensed asbestos consultant (LAC) services during City of Jacksonville LaVilla Redevelopment Project. The project team completed surveys of 100 buildings in the area.

Peoples Gas Systems, Inc. **Tampa, Florida**
Prepared and presented an Asbestos Awareness course for Peoples Gas Systems' (PGS) safety professionals and installation supervisors. The course included 35-mm slides and color overheads, which will be used by PGS for future in-house training.

Rayonier, Inc. **Fernandina Beach, Florida**
Managed large lead paint removal program in a pulp and paper facility. Tasks included air monitoring, preparation of specifications and observation of abatement activities. The containment for the operation included a negative pressure chamber suspended from roof trusses.

University of Florida, TREEO Center **Gainesville, Florida**
Provided instruction and overall management of three different lead abatement courses. The courses included Lead Abatement Supervisor, Inspection for Lead, and Lead Risk Assessment.

Asbestos Consultation at Tampa International Airport **Tampa, Florida**
This project involves an asbestos survey of the entire airport, and air monitoring of in-place friable asbestos. An O&M plan has been completed for all areas of the airport containing asbestos. Managed the removal of more than 400,000 square feet of friable asbestos valued at more than $3 million in construction costs. The design of these projects was extremely complex and involved building working platforms under which baggage handling vehicles traveled while asbestos abatement occurred above. Operations at the airport continued with minimal disruption by using a dual barricade system, construction barriers with secondary asbestos-tight enclosures.

United States Postal Service **Various Locations, Florida**
This project includes surveys of existing facilities, preparation of a report with findings, recommendations; contract bid documents, field administration, bulk sampling and air sampling for asbestos fibers on a work order-basis.

Hillsborough County School Board **Tampa, Florida**
The school district is one of the largest in the country with more than 12,000,000 ft^2 of area in 167 schools. Services included complete surveys; specification and plan development; training; PCM, TEM, and PLM analyses; and abatement contractor selection.

Lawrence A. (Larry) Kapustka

Education: Ph.D., Botany, Plant Physiological Ecology, University of Oklahoma, Norman, OK, 1975
M.S., Botany, Plant Physiological Ecology, University of Nebraska-Lincoln, NE, 1972
B.S. Ed. Biology, University of Nebraska-Lincoln, NE, 1970

Affiliations: (ASTM) American Society for Testing and Materials
(ESA) Ecological Society of America
(IALE-US) International Association of Landscape Ecology
(SETAC) Society for Environmental Toxicology and Chemistry
(SRA) Society for Risk Analysis

Experience:

2005 to date **Golder Associates** **Calgary, Alberta**
Associate; Senior Ecotoxicologist
Responsible for advancing the state of the science in ecological risk assessment (especially spatially explicit approaches), environmental management decision approaches, and ecological valuation methods. This is to be accomplished on projects as value-added activities with current clients and identifying new clients; mentoring members of project teams; and development instructional materials for Golder University and Golder Institute.

1990 to 2005 **e**cological **p**lanning and **t**oxicology, inc. **Corvallis, Oregon**
Senior Ecotoxicologist, President
Responsibilities included strategic planning, management, and performance of projects involving ecological risk assessment, terrestrial plant and invertebrate toxicity tests, Natural Resource Damage Assessments, toxicity test protocol development, and field surveys. Responsibilities also included scientific research, business development, marketing, and business operations.

1988 to 2000 **U.S. Environmental Protection Agency** **Corvallis, Oregon**
Research Ecologist, GM-14, Team Leader of the Plant Toxicology and Hazardous Waste Teams
Responsibilities included planning, budgeting, and managing the research focused on characterization of plant physiological and ecological responses to xenobiotic chemicals, development of ecological risk assessment methods, development of ecological/toxicological assessment approaches and methods for hazardous waste sites, and providing technical assistance to the Environmental Protection Agency's Regional Superfund Offices.

1978 to 1984 **Miami University** **Oxford, Ohio**
Professor of Botany
Responsibilities related to teaching undergraduate and graduate courses in general botany, plant ecology, field ecology, and physiological ecology; advising undergraduate and graduate students; mentoring , conducting research in physiological ecology, microbial ecology, restoration ecology, and systems ecology.

1975 to 1978 **University of Wisconsin-Superior** **Superior, Wisconsin**
Academic Staff
Responsibilities included teaching undergraduate courses in ecology, forestry, and plant physiology, advising undergraduate students; conducting research in applied plant ecology related to the role of vegetation in controlling erosion.

Lawrence A. (Larry) Kapustka

SELECTED PROJECT EXPERIENCE

American Cyanamid
Kapustka led a team of scientists that provided comprehensive reviews of data packages for new and existing pesticides from 1992 through 1998. The reviews included evaluation of toxicity, exposure, intended use scenarios, fate and transport, and risk to non-target species. The assessments integrated laboratory and field toxicity data with residue chemistry and biochemical markers of exposure to develop a comprehensive assessment of risks to fish and wildlife.

Rohm & Haas
Kapustka led a team of scientists that reviewed data in 1994 from laboratory toxicity tests performed to address regulatory triggers associated with intended use of a new pesticide. The evaluation focused on data quality, interpretation, and implication of data relative to the pesticide registration process.

CIBA-GEIGY
Kapustka led a team of scientists that reviewed data in 1991 through 1994 from toxicity tests and field studies conducted to support registration of pesticides. Our reviews were organized to address concerns related to the evaluation of ecological risk. The risk assessment integrated biologically relevant aspects of pesticide use scenarios, application rates, fate and transport, hazard, and exposure.

Rhone-Poulenc
Kapustka led a team of scientists that prepared an ecological risk assessment in 1992 contributing to the chemical registration process. The risk assessment integrated biologically relevant aspects of fate and transport, hazard of chemicals, and exposure for presentation to the U.S. EPA regulatory offices.

US EPA Arctic Program Organochlorine Database
Kapustka directed a team of experts in performing a quality control evaluation of analytical data quantifying organochlorines in soils and vegetation collected from the Arctic Circle. Following the recalculation of blanks, standards, and duplicates, all data were reviewed and flags assigned as appropriate; compiled all data into an ACCESS® Database to facilitate further studies using these data.

International Copper Association – Copper in Terrestrial Systems
Kapustka led a team of scientists that searched the literature for all information pertaining to terrestrial effects of copper in soil, both laboratory and field studies. Over 350 articles were obtained and reviewed. A summary document was produced, detailing the mechanisms of toxicity, endpoints and responses measured in laboratory studies, field verification of laboratory results, and any other information pertaining to copper. While soil benchmarks were not developed, at the express request of the client, general effects ranges were described. Future research needs were recommended and prioritized. This was submitted in 1998.

Chemical Manufacturers Association -- Phthalate Esters
Kapustka led a team of scientists that reviewed all literature available in 1998 on terrestrial toxicity effects of phthalate esters (plants, soil invertebrates, and wildlife), with a particular focus of determining which ones have information suitable for use in ecological risk assessments.

Chemical Manufacturers Association –- Ecological Methods
Kapustka led a team of scientists that developed a search strategy and collected information from the literature and text books on methods and their applications to ecological risk assessment. All papers were read, coded in regard to category of method, applicable biome, and other ecologically relevant topics as well as in terms of difficulty to perform, time and cost of effort, and acceptability of the approach. Nearly 2,000 records were generated from over 300 references. These were entered into a Microsoft Access database, which was given to the client as a PC accessible CD-ROM in 1997.

Lawrence A. (Larry) Kapustka

International Zinc Association

Kapustka was on a team of scientists that the International Zinc Association (IZA) had the industry lead in responding to the European Union's environmental risk assessment of zinc; conducted for IZA a review in 1997 of data and approaches used to estimate effects of zinc to plants and soil invertebrates and development of soil threshold values for use in the risk assessment. This included a review of the literature not used by the Dutch in their documentation as well as a critique of the particular studies that were used. Laboratory to field verification of selected thresholds also was being reviewed.

US EPA Ecological Soil Screening Level (Eco-SSL) Development – American Petroleum Institute

Kapustka was involved in early scoping discussions with EPA (1999 – 2002) that led to the development of protocols to conduct literature searches, reviews, and evaluation of technical content for use is setting Ecological Soil Screening Levels. He was a key participant in the review process that set SSLs for plants and invertebrates. In addition, he led a team of scientists that followed the SSL Protocols to establish SSLs for plants, invertebrates, birds, and mammals for the 16 common PAH analytes. Finally, on this project Kapustka led a team of scientists that wrote a review paper on approaches used in various jurisdictions to set Soil Protective Values.

Chemical Manufacturers Association - Plant Uptake and Terrestrial Food Web Models

Kapustka led a team of scientists (2000 – 2002) that conducted a thorough literature review on Plant Uptake and Terrestrial Food Web Models to identify research priorities that might improve the technical capacity of conduct ecological risk assessments of terrestrial systems.

Hudson River Ecological Risk Assessment Review

Kapustka was appointed to a special peer-review panel in 2003 for the US EPA to evaluate the quality, completeness, and adequacy of the Ecological Risk Assessment prepared for the Upper Hudson River Operable Unit. In addition to preparing a detailed report on the content of multiple reports and companion documents related to the risk assessment, the panel was convened for two public meetings to discuss first the nature and extent of work that had been performed by the assessment team, and second to deliberate among panelists regarding the quality of the risk assessment. A synthesis of panelists findings and opinions was prepared and submitted to EPA in August 2000

Resolution Copper — Tucson, Arizona

Member of a select science advisory panel appointed by Rio Tinto to work with Resolution Copper and its other contractors to assist with the development of methods and approaches in a pre-NEPA phase of activities to ensure that relevant environmental and social aspects are anticipated and addressed.

Teck Cominco (CAN) — Trail, British Columbia

Member of the Project Team and the Technical Advisory Committee providing expertise on the terrestrial and wetland components of the large-area ecological risk assessment effort.

Anderson-Calhoun — Colville, Washington

This project involves preparing an Engineering Evaluation/Cost Analysis (EE/CA) in accordance with an Administrative Order of Consent (AOC) between the Workgroup (The Goldfield Corporation, Blue Tee Corp. and Combustion Engineering, Inc).and the United States Environmental Protection Agency (USEPA). The project is under the direction of Doug Morell (Golder, Redmond, WA). Kapustka is responsible for the streamlined ecological risk assessment component. The applicable regulations for the site include the State of Washington's Model Toxics Control Act (MTCA).

Lawrence A. (Larry) Kapustka

Teck Cominco (US) **Pend Oreille, Washington**

Kapustka is advising the Project Director (Doug Morell, Golder, Redmond, WA) on wildlife risk assessment aspects of the project.

Kennecott Utah Copper Corporation, **near Salt Lake City, Utah**

This project involved strategic planning of ecological risk assessment issues: developed the strategic plan and scope of work for the project. Key elements of the plan included consensus decisions on assessment endpoints; collaborated with large consulting firms, used modern approaches to field work, and sophisticated data management and interpretation in this project. The work was coordinated with Federal, State, and Local governmental Departments and Agencies having jurisdictional authority related to the project. Interaction with public interest groups occurred as part of a related Environmental Impact Statement. Three major components of the 360 km^2 area were characterized: Uplands of the Northern Oquirrh Mountains, Southshore wetlands, and the Great Salt Lake. Final reports on all three components were submitted to the US EPA.

Additional analyses of the field data collected during the ERA have been used to generate indices of biodiversity potential for different areas of Kennecott property. This baseline work is also being used to develop a site-wide landuse management plan.

UNEP-IETC **Shenyang, People's Republic of China**

Under contract with the United Nations Environmental Programme – International Environmental Technology Centre (UNEP-IETC), Kapustka drafted the first Environmental Profile for the municipality and assisted with development of the Shenyang Sustainable Cities Project Document for the Shenyang Municipal Area, Liaoning Province, People's Republic of China. The area included the urban center of Shenyang and surrounding lands that support agriculture, grassland, forestry, and riparian areas in northeastern China totaling some 13,000 km^2. The human population of the Shenyang Urban Area is 6.5 million.

UNEP-IETC **Wuhan, People's Republic of China**

Under contract with the United Nations Environmental Programme – International Environmental Technology Centre (UNEP-IETC), Kapustka drafted the first Environmental Profile for Wuhan, Hubei Province, People's Republic of China. The Wuhan Municipal Area supports 7 million people. Key environmental issues relate to domestic and industrial waste. The documents developed will be critical resources for planning land use activities and future economic development of the region.

Lawrence A. (Larry) Kapustka

SELECTED PUBLICATIONS

Kapustka, L. A, E. Eskew, J. Yocum. Plant toxicity testing to derive ecological soil screening levels for cobalt and nickel. *Environ. Toxicol. Chem.* 25 (3): 865-874.

Kapustka, L. A. 2005. Assessing ecological risks at the landscape scale: opportunities and technical limitations. *Ecology Society* 10 (2): 11. [online] URL: http://www.ecologyandsociety.org/vol10/iss2/art11/

ASTM. 2005. E2385-04 Standard guide for estimating wildlife exposure using measures of habitat quality. Vol. 11.05. *American Society for Testing and Materials*. Conshohocken, PA. [Author Kapustka, L. A.]

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Lawrence A. (Larry) Kapustka

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Lawrence A. (Larry) Kapustka

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Audrey Wagenaar

Education:

M.Sc., Medicinal Chemistry, University of Sussex, U.K. 1992.
B.Sc., Combined Honours Chemistry and Biology, University of British Columbia, Vancouver, B.C. 1990.

Affiliations:

American Chemical Society
Society for Risk Analysis
Society for Environmental Toxicology and Chemistry

Experience:

2004-Present **Golder Associates** **North Vancouver, BC**
Senior Environmental Scientist
Responsibilities include conducting human health risk assessments, managing and providing senior review for ecological risk assessments; business development and marketing.

2002-2004 **EVS Environment Consultants** **North Vancouver, BC**
Senior Environmental Scientist
Responsibilities included conducting human health risk assessments, managing and providing senior review for ecological risk assessments; business development and marketing.

2001-2002 **Golder Associates** **Mississauga, ON**
Senior Risk Assessor/Toxicologist
Responsibilities included conducting site-specific risk assessments and developing remediation criteria; peer review of site-specific risk assessments; developing chemical-specific toxicological criteria; providing expert advice on potential health effects based on toxicological information; project management; and risk communication.

1999-2001 **Ontario Ministry of the Environment** **Toronto, ON**
Senior Regulatory Toxicologist
Responsibilities included providing expert advice for community-based risk assessments; developing provincial air standards; reviewing site-specific risk assessments; and risk communication.

1997-1999 **Eastern Research Group** **Boston, USA**
Environmental Scientist
Responsibilities included providing technical advisory services to various government and corporate clients in the areas of human health risk assessment; ecological risk assessment; medicinal chemistry; and database development.

1993-1997 **Environment Canada** **North Vancouver, BC**
Toxic Substances Evaluation Scientist/ Controls Program Officer
Responsible for evaluating the environmental toxicology of chloramine - a drinking water disinfectant - under the Priority Substance List (PSL) of Canadian Environmental Protection Act (CEPA). Project involved collecting chloramine-related toxicological data, development of a Microsoft Access database, evaluation of data and data quality, and determination of appropriate assessment endpoints. In addition, general advisory and consulting services in the area of toxicology were provided to senior management, other departmental scientists, federal/ provincial agencies, industry and the general public.

Audrey Wagenaar

CERTIFICATION AND CONTINUED TRAINING

Probabilistic Risk Assessment, Harvard School of Public Health, Cambridge, Massachusetts, September 2000.

Expert Witness Training, Ontario Ministry of the Environment, Toronto, Ontario, June 2000.

Fourth International Conference on Arsenic Exposure and Health Effects, The Society of Environmental Geochemistry & Health, San Diego, California, June 2000.

Crystal Ball – Probabilistic Risk Assessment Software Training, Toronto, Ontario, March 1999.

Human Health and Ecological Risk Assessment, SENES Consultants and Oak Ridge National Laboratories, Vancouver, British Columbia, June 1994.

Audrey Wagenaar

SLECTED PROJECT EXPERIENCE – HUMAN HEALTH RISK ASSESSMENT

Public Health Risk Assessment for Superfund Site - Marine Corps Logistics Base Barstow — Barstow, California

Scientist responsible for preparing the human health risk assessment of a drinking water supply containing elevated levels of trichloroethene, vinyl chloride, and *cis*-1,2-dichloroethene at Marine Corps Logistics Base, Barstow, California. The risk assessment was prepared for the US Agency for Toxic Substances and Disease Registry (ATSDR) and addressed both on- and off-Site impacts of the chlorinated solvents. The health risk assessment involved extensive communication with ATSDR and U.S. Marine Corps officials.

Public Health Risk Assessment for Superfund Site - Mountain Home Air Force Base — Mountain Home, Idaho

Scientist responsible for preparing the human health risk assessment of a drinking water supply containing elevated levels of trichloroethene at Mountain Home Air Force Base, Mountain Home, Idaho. The risk assessment was prepared for the US Agency for Toxic Substances and Disease Registry (ATSDR) and involved consultation with ATSDR and U.S. Army officials.

Human Health Risk Assessment – Recreational Water Use Canadian National Railway Company — Wabamun, AB

Principal human health risk assessor responsible for risk assessment of sediment and surface water impacted by an oil spill into a large freshwater recreational lake, as the result of a train derailment. The primary contaminants of concern were PAHs, novel alkylated PAHs and selected VOCs. The risk assessment involved the development of toxicity reference values for alkylated PAHs, as well as complex peer review and multi-stakeholder consultation process. The results were presented to the local medical officer of health, who subsequently removed the non-water use advisory for recreational purposes.

Development of Toxicity Reference Values - Pfizer — North Haven, Connecticut

Principle toxicologist responsible for evaluating and/or developing toxicity reference values for 38 novel substances found in soil, groundwater, and surface water at a former chemical manufacturing site. The site is undergoing a RCRA evaluation in consultation with state government. The evaluation process included determining whether toxicity reference values (TRVs) were available for a substance, conducting a comprehensive literature search to obtain current toxicological information for the substances and then assessing the non-carcinogenic, carcinogenic and mutagenic effects of the substances. The assessment also involved application of modifying factors to account for potential mutagenicity and carcinogenicity to existing reference values and developing oral and inhalation reference doses for chemicals which currently lack toxicity reference values. Toxicity profiles were prepared to document the assessment of each substance and provide a rationale for selection/derivation of TRVs for each substance. The TRVs were subsequently utilized to develop site-specific risk-based cleanup standards for these substances.

Risk Assessment of the Impact of Stormwater Run-off from a Copper Mine on Vegetable Gardens of a Native American Reservation — Arizona

Risk assessor responsible for determining potential impact of human consumption of vegetables irrigated with stormwater run-off containing elevated levels of metals from a copper tailings area. Risk assessment was prepared for the Agency of Toxic Substances and Disease Registry (ATSDR) and involved consultation with ATSDR and the local Native American government.

Audrey Wagenaar

Human Health Risk Assessment of
Former Plant Nursery Operations – NOAA and Ridolfi Engineers Washington, DC
Principle human health risk assessor responsible for a multimedia risk assessment of a 44-acre former plant nursery operations located in Washington DC. The site will be redeveloped into a passive recreational park within the US National Park system and will include a sensitive wetland area. Primary contaminants of concern included in the assessment were metals, PAHs, PCBs and pesticides, which are currently found in site soils, sediment, groundwater, and surface water. The risk assessment was conducted to CERCLA standards and involved a complex multistakeholder (NOAA, Architect of the Capital, EPA and District of Columbia Department of Health) and regulatory review process.

Head Technical Report – Human Health Risk Assessment
Port of Melbourne Corporation Melbourne, Australia
Principle scientist responsible for planning, management and conducting a detailed quantitative human health risk assessment to assess the uptake of contaminants (metals, PAHs, and pesticides) from sediment by ecological receptors (three species of fish and mussels) as the result of proposed dredging activities in Port Philip Bay, Melbourne, Australia and the subsequent consumption of these fish and mussels by recreational and subsistence fisher populations. Responsibilities included providing direction for data screening, problem formulation and food chain modeling as well as conducting the HHRA, report writing, quality assurance/control, and management of budget, scope, timelines and staff resources as well as client liaison.

Human Health Risk Assessment –Lead-Zinc Mine Tailings
The World Bank and GeoConsult Engineers Mojkovac, Montenegro
Principle human health risk assessor responsible for a multimedia screening level risk assessment of the tailings management facility adjacent to the community of Mojkovac, Montenegro. Although capped, portions of the tailings are flooded and have been used for recreational purposes including fishing and swimming. The multimedia screening level risk assessment will be used to assist the World Bank in addressing the community issues and risk management options.

Site-Specific Human Health and Ecological Risk Assessment
Former Power Stations - Ontario Power Generation Inc. Niagara Falls, ON
Principle human health risk assessor responsible for conducting a site-specific human health and ecological risk assessment of a two former historic hydroelectric power stations that will potentially be redeveloped as museums or for other public use. The primary contaminants of concern were metals, petroleum and polycyclic aromatic hydrocarbons in soils. Risks were assessed for future residential users as well as maintenance and construction workers.

Site-Specific Human Health and Ecological Risk Assessment
Former Landfill - Claridge Homes Corporation Ottawa, ON
Principle human health risk assessor responsible for conducting a site-specific human health and ecological risk assessment of a former landfill and salt storage site that is being redeveloped for residential and parkland use. The primary contaminants of concern were metals and polycyclic aromatic hydrocarbons in soil. Site-specific metal bioaccessibility in soil was used in the exposure calculations. Risks were assessed for future residential users as well as maintenance and construction workers.

Audrey Wagenaar

Screening-Level Risk Assessment, Commercial Office Tower
Royal Bank of Canada and EBA Consulting Engineers **Vancouver, BC**
Human health risk assessor responsible for conducting a human health risk assessment of a commercial office tower constructed on the site of a former drycleaner operation. The risk assessment was conducted to determine potential risks to building users and off-site receptors resulting from elevated concentrations of tetrachloroethene present in site groundwater.

Human Health Risk Assessment – Impact of Landfill Leachate
On Drinking Water Supply - District of Mission **Mission, BC**
Principal human health risk assessor responsible for risk assessment of a community drinking water supply and recreational swimming area impacted by landfill leachate runoff as the result of a severe rainfall event. The primary contaminants of concern were metals, PAHs, PCBs, pesticides and dioxin/furans. The results were presented to the local medical officer of health, who subsequently removed the non-water use advisory for drinking water and recreational purposes.

Development of the Draft Uranium Air Standard
Ontario Ministry of the Environment **Ontario**
Co-author of the provincial uranium air standard based on the chemical toxicity specific to exposures in a community adjacent to a uranium refinery (Pt. Hope, Ontario). The uranium air standard was set to ensure that unacceptable levels of uranium did not accumulate in soil and utilized a multimedia approach. The development of the uranium standard involved extensive communication and consultation with the local medical officer of health, industrial stakeholders, local government and public interest groups.

Update of the Canadian National Contaminated Sites (NCS)
Classification System
Canadian Council for Ministers of the Environment **Ottawa, ON**
Project manager and principle scientist involved in updating the existing NCS classification system which is used to rank federal sites. The updated NCS is currently under review on the CCME website, and once approved will be used by all consultants working on federal sites to standardize prioritization for funding and action. Primary changes included the reduction of ambiguity to assist in the standardization of responses, improved clarity and incorporation of additional technical scoring such as northern specific issues.

Finalization of Clean-up Criteria
Port Hope Low Level Radioactive Waste Management Office **Port Hope, ON**
Co-author of an assessment of cleanup criteria for non-radiological contaminants to be used in an Ontario community that had been historically impacted by uranium metal processing. This project involved the critical assessment of exposure models used in Ontario and other jurisdictions to derive risk-based cleanup criteria and determined the suitability for use in this community. A site-specific multimedia approach was recommended for several contaminants of concern.

Screening–Level Risk Assessment, Active Drydock
Vancouver Port Authority **Vancouver, BC**
Senior risk assessor responsible for conducting a human health risk assessment of an active drydock and associated property for purposes of a land transaction. The risk assessment was conducted to determine potential health risks to drydock and construction workers as well as site trespassers to elevated concentrations of petroleum hydrocarbons and metals in site soils and groundwater.

Audrey Wagenaar

Preliminary Quantitative Risk Assessment
Defense Construction Canada **Bedford, NS**
Senior human health risk assessor responsible for conducting a preliminary quantitative human health risk assessment of a former landfill at a former dredgeate disposal facility at the Canadian Forces facility. The risk assessment was conducted to determine risks to commercial and construction workers resulting from elevated concentrations of metals and polycyclic aromatic hydrocarbons in soil and sediment. The report was used to obtain funding under the Federal Contaminated Sites Action Plan for further work.

Screening–Level Risk Assessment, Application of Coal Tar Enamel
Greater Vancouver Regional District **Vancouver, BC**
Senior risk assessor responsible for conducting a human health risk assessment related to inhalation of PAHs, particulates and VOCs as the result of application of coal tar enamel to large diameter water pipes that are being placed through a series of residential neighbourhoods. The risk assessment was conducted to determine potential health risks to construction workers and nearby residents.

Site-Specific Risk Assessment of a Former Iron
Pigments Manufacturing Facility - Elementis Pigments **Etobicoke, ON**
Senior toxicologist responsible for conducting a site-specific risk assessment to determine the potential for adverse health impact to site users exposed to elevated metals concentrations in soil. A site-specific soil remedial criterion was developed for iron. The project also involved significant interaction with legal council for the former facility.

Screening-Level Risk Assessment, Public Storage Facility
Public Storage Canada **Vancouver, BC**
Human health risk assessor responsible for conducting a human health risk assessment of a public storage facility constructed on a former commercial/industrial sited The risk assessment was conducted to determine potential risks to building users and off-site receptors resulting from elevated concentrations of concentrations of petroleum hydrocarbons in groundwater and lead in soil.

Screening-Level Risk Assessment of a
Manufacturing Facility **Confidential**
Human health risk assessor responsible for conducting a human health risk assessment of a manufacturing facility which was potentially impacted by a historic spill of chlorinated solvents. The risk assessment was conducted to determine potential risks to building users and construction workers associated with inhalation indoor and outdoor air as the result of the subsurface vapour intrusion resulting from elevated concentrations of chlorinated solvents in site soils and groundwater.

Screening-Level Risk Assessment, Church
Grace Presbyterian Church **Vancouver, BC**
Human health risk assessor responsible for conducting a human health risk assessment of a church and underground parking garage in adjacent commercial building impacted by a historic fuel oil spill. The risk assessment was conducted to determine potential risks to building users and off-site receptors resulting from elevated concentrations of petroleum hydrocarbons and polycyclic aromatic hydrocarbons present in site soil.

Screening-Level Risk Assessment
Former Corrections Camp - British Columbia Building Corp.
and Morrow Environmental Consultants Inc. **Alouette Lake, BC**

Senior risk assessor responsible for conducting a human health risk assessment of a former corrections camp on the shore of Alouette Lake which had been the site of fuel storage leak. The future site use is a proposed recreational camp for children. The risk assessment was conducted to determine potential risks to building users resulting from elevated concentrations of residual petroleum hydrocarbons present below several residential buildings on-site.

PROJECT RELATED EXPERIENCE - ECOLOGICAL RISK ASSESSMENT

Terrestrial and Groundwater Ecological Risk Assessments South East False Creek
Vancouver, BC

Project manager for terrestrial and groundwater ecological risk assessments of a former industrial site scheduled for redevelopment for the 2010 Winter Olympic Athletes Village and later for use as a mixed residential and urban park property. Contaminants of potential concern included elevated concentrations of metals and PAHs in soil and groundwater. Responsibilities included providing direction and design of assessments, overseeing data analysis and food chain modeling and overall responsibility for report writing.

Ecological Risk Assessment of a Former Sawmill site **Vancouver, BC**

Project manager for terrestrial and aquatic groundwater ecological risk assessments of metals and chlorophenols at a former sawmill site adjacent to the Fraser River. Responsibilities included providing direction and design of assessments, overseeing data analysis and food chain modeling and overall responsibility for report writing.

Ecological Risk Assessment for Pt. Atkinson Lightstation and
Lighthouse Park **West Vancouver, BC**

Project manager for terrestrial and aquatic ecological risk assessments of elevated metals in soils adjacent to lightstation and in several areas of the park. Responsibilities included providing direction and design of assessments and problem formulation workshop, overseeing data analysis and food chain modeling and overall responsibility for report writing.

Ecological Problem Formulation
Tofino Airport **Tofino, BC**

Project manager and senior risk assessor for terrestrial and aquatic ecological problem formulations for three former landfill sites associated with the Tofino airport. Contaminants of concern included elevated metals and petroleum hydrocarbons in site soils, groundwater, surface water and sediments. The problem formulation was presented to stakeholders for input and will be used to obtain funding under the Federal Contaminated Sites Action Plan for further work. Responsibilities included providing direction and design of problem formulation workshop, overseeing data analysis and report writing.

Ecological Risk Assessment Policy Support for the
United States Environmental Protection Agency (US EPA) **Washington, DC**

Scientist providing technical support to the US EPA on a number of ecological risk assessment policy issues. Responsibilities included attending internal technical forums and documenting results of discussions. Topics covered included: (i) use of bioavailability in risk assessment; (ii) development of management objectives for ecological risk assessment; and (iii) use of in-place inactivation and natural ecological remediation activities for metals in soil.

Audrey Wagenaar

Evaluation of the Environmental Toxicology of Inorganic Chloramines — Vancouver, BC

Scientist responsible for evaluating the ecological toxicology of the drinking water disinfectant, chloramine, in accordance with the Priority Substances II List protocol. Technical tasks included collecting chloramine-related toxicological data, evaluating the data and data quality, determining that a new analytical method would need to be developed for the assessment, and selecting appropriate assessment endpoints for additional toxicity testing. Another key area of the project involved setting up a Environmental Resource Group consisting of chloramine experts from various academic, industrial and government sources to provide ongoing feedback on the technical decisions made during the evaluation. Formal oral presentations were made to the Environmental Resource Group in Ottawa and Vancouver.

Environment Canada Polycyclic Aromatic Hydrocarbon Risk Management Workshop — Vancouver, BC

Scientist responsible for organizing a workshop to discuss risk management options for a community in Northern British Columbia impacted by industrial emissions of polycyclic aromatic hydrocarbons. Other responsibilities included facilitating summary discussions and documenting workshop proceedings. Workshop participants included industrial stakeholders and their technical consultants, government scientists and officials, and native elders from the impacted community.

PROJECT RELATED EXPERIENCE - THIRD-PARTY PEER REVIEW

Review of Site-Specific Risk Assessments — Ontario

Senior Regulatory Toxicologist responsible for reviewing site-specific risk assessments and remediation criteria to ensure compliance with the Guideline for Use at Contaminated Sites for the Ontario Ministry of the Environment. Excellent knowledge of Ontario Contaminated Sites Guidelines and the Ministry's site-specific risk assessment approval process.

Peer Review of Four Site-Specific Risk Assessments for Off-Site Impacts — Ontario

Senior Toxicologist responsible for the peer review of four site-specific risk assessments that had been conducted to determine the potential human and ecological risks originating from an industrial facility. Soil and groundwater remedial criteria were also reviewed. The primary contaminants of concern were elevated levels of chlorinated solvents such (such as trichloroethene, vinyl chloride and *cis*-1,2-dichloroethene) which have migrated in groundwater to a residential neighbourhood. The peer review was conducted in accordance with the protocol outline in the "Guidance on Site-Specific Risk Assessment for Use at Contaminated Sites in Ontario".

PROJECT RELATED EXPERIENCE - EXPERT ADVICE (TOXICOLOGY)

Technical Advisor, Human Health Risk Assessment — Wawa, ON

Senior Regulatory Toxicologist representing the Ontario Ministry of the Environment on the Wawa Technical Steering Committee. Responsibilities included guiding and critically reviewing the human health risk assessments and biological monitoring studies of a population living adjacent to soil containing elevated levels of arsenic. Regular meetings with the local medical officer of health, industrial stakeholders, local government and their technical consultants were required.

Audrey Wagenaar

Technical Advisor, Community-Based Risk Assessment, Pt. Colborne, ON

Senior Regulatory Toxicologist representing the Ontario Ministry of the Environment in the multistakeholder development of a community-based risk assessment approach for use in Pt. Colborne, Ontario. Pt. Colborne has elevated metals concentrations in the soils in the area resulting from historical metal refining activities. Responsibilities included critically reviewing the proposed community-based approach including the framework for the human health and ecological risk assessments, potential risk management measures and implementation of these risk management measures. Risk communication at public forums and frequent interaction with the local medical officer of health, industrial stakeholders, local government and their technical consultants were required.

Provision of Expert Toxicological Advice to Ontario Medical Officers of Health Ontario

Senior Regulatory Toxicologist responsible for providing expert toxicological advice to Ontario Medical Officers of Health on an "as-needed" basis. Projects included initiation of two blood lead screening programs for children and pregnant women exposed to lead (1) in mine tailings used for garden landscaping and paving and (2) from aerial deposition in gardens in a smelting town; and assessment of off-site odour/health issues related to remediation activities.

Ontario Ministry of the Environment Course on the Contaminated Sites Guidelines Ontario

Key Speaker at the Ontario Ministry of the Environment's course on Contaminated Sites Guidelines for environmental consultants and municipal planners held in several locations throughout Ontario. Discussed how to conduct the human health component of a site-specific risk assessment, including best practices and technical review considerations.